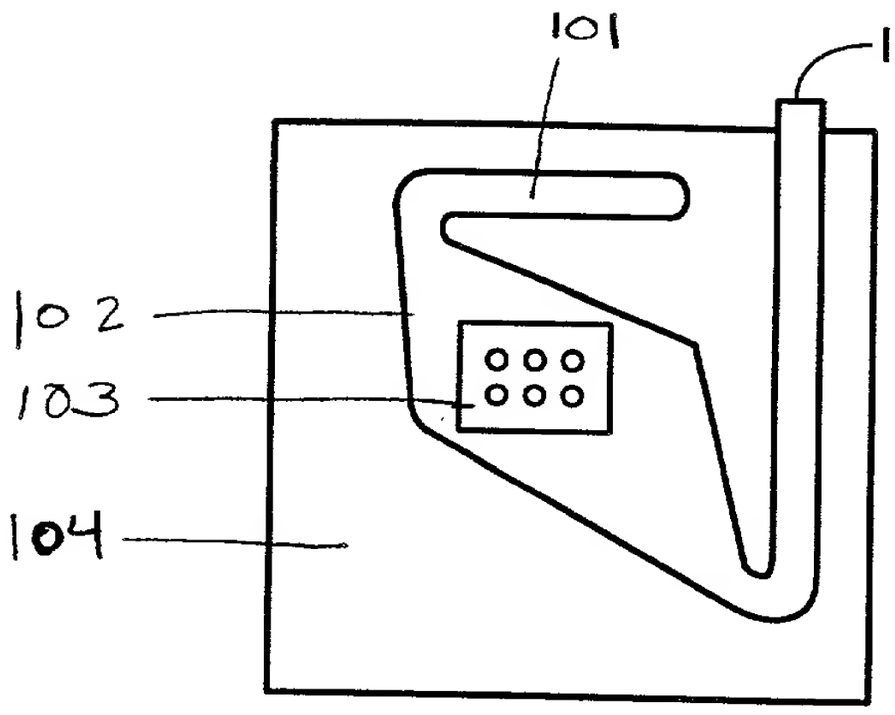


Fig. 1A

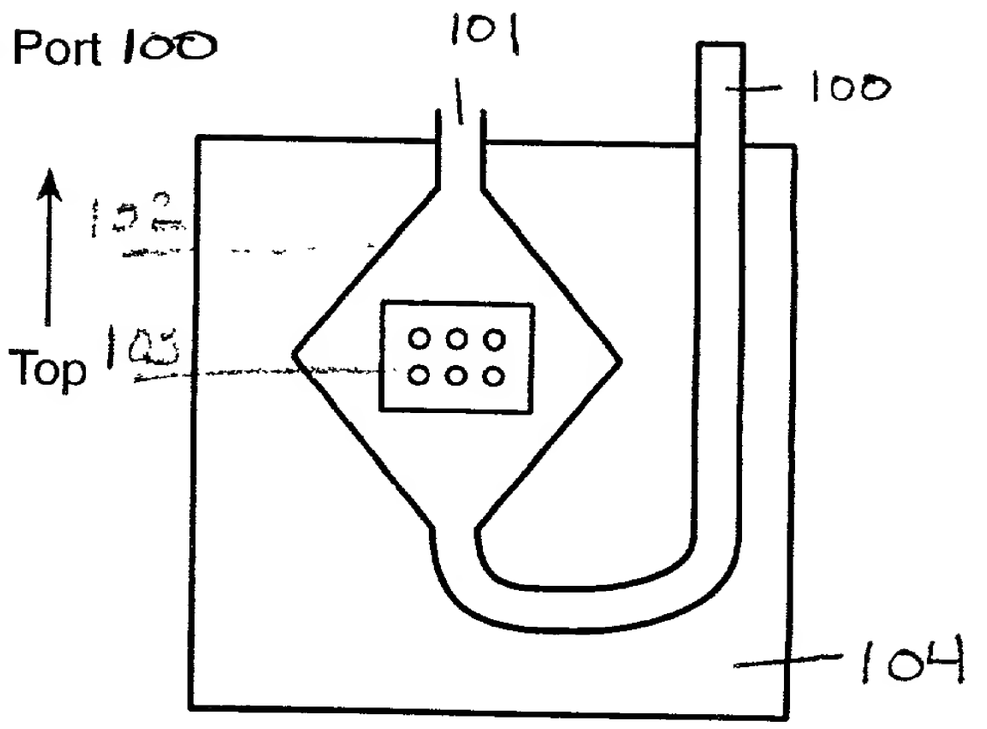


Fig. 1B

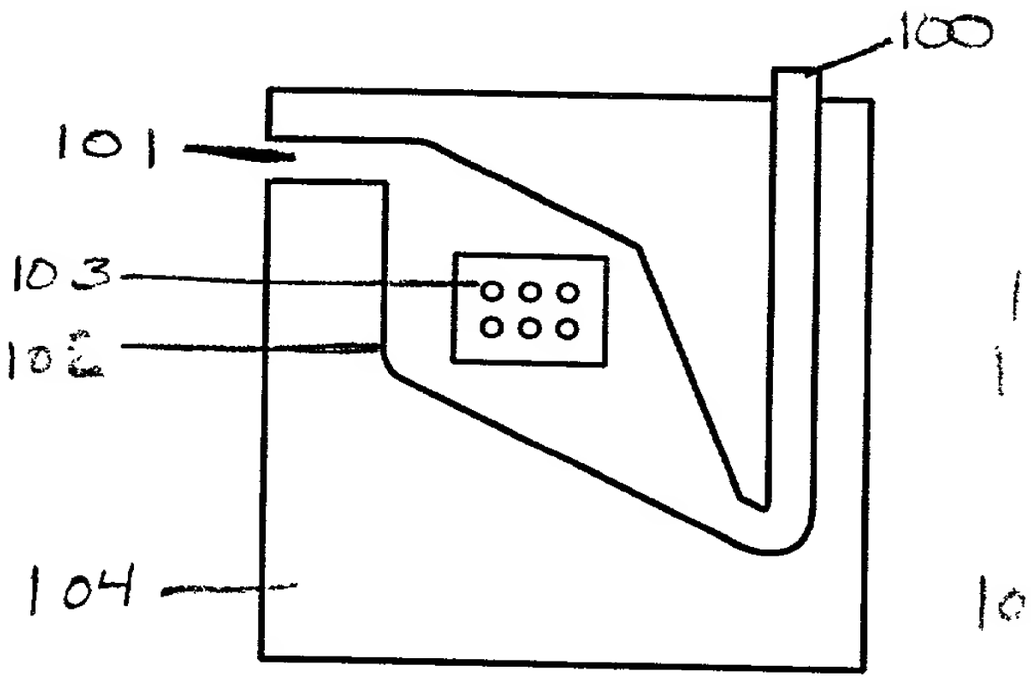


Fig. 1C

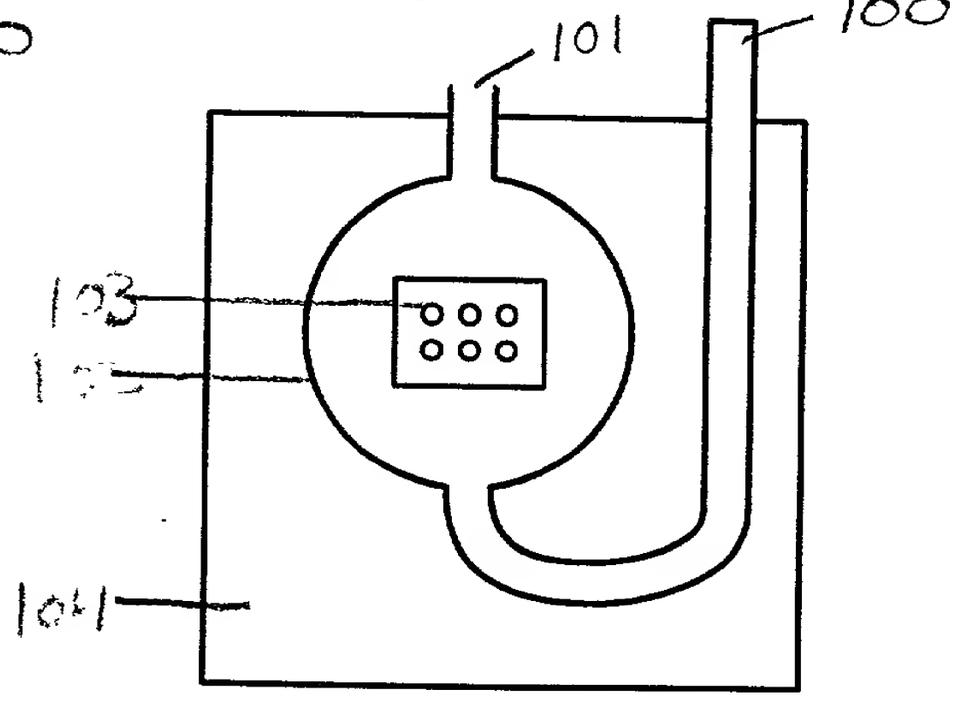


Fig. 1D

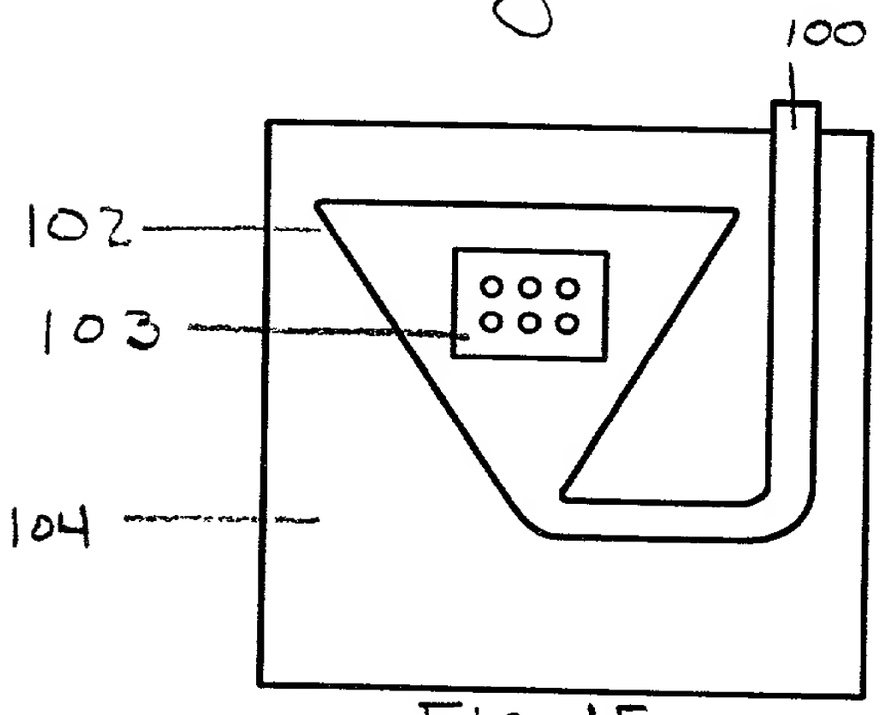


Fig 1E

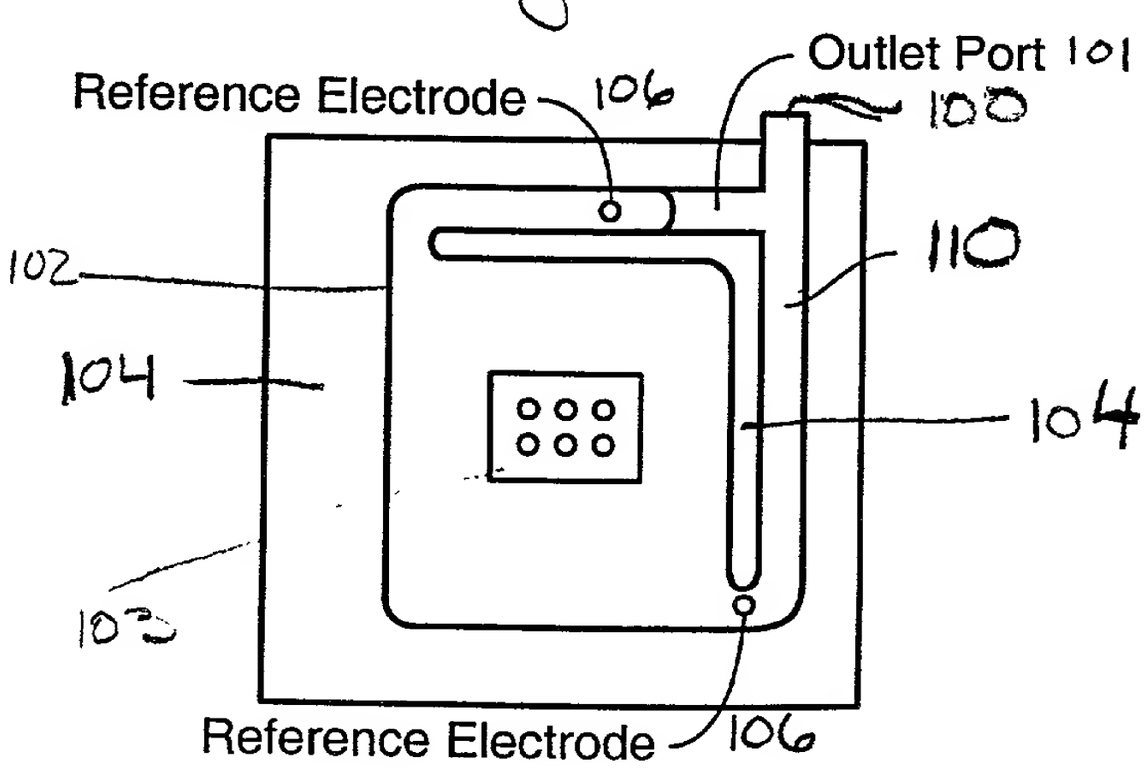


Fig 1F

FIGURE 1G

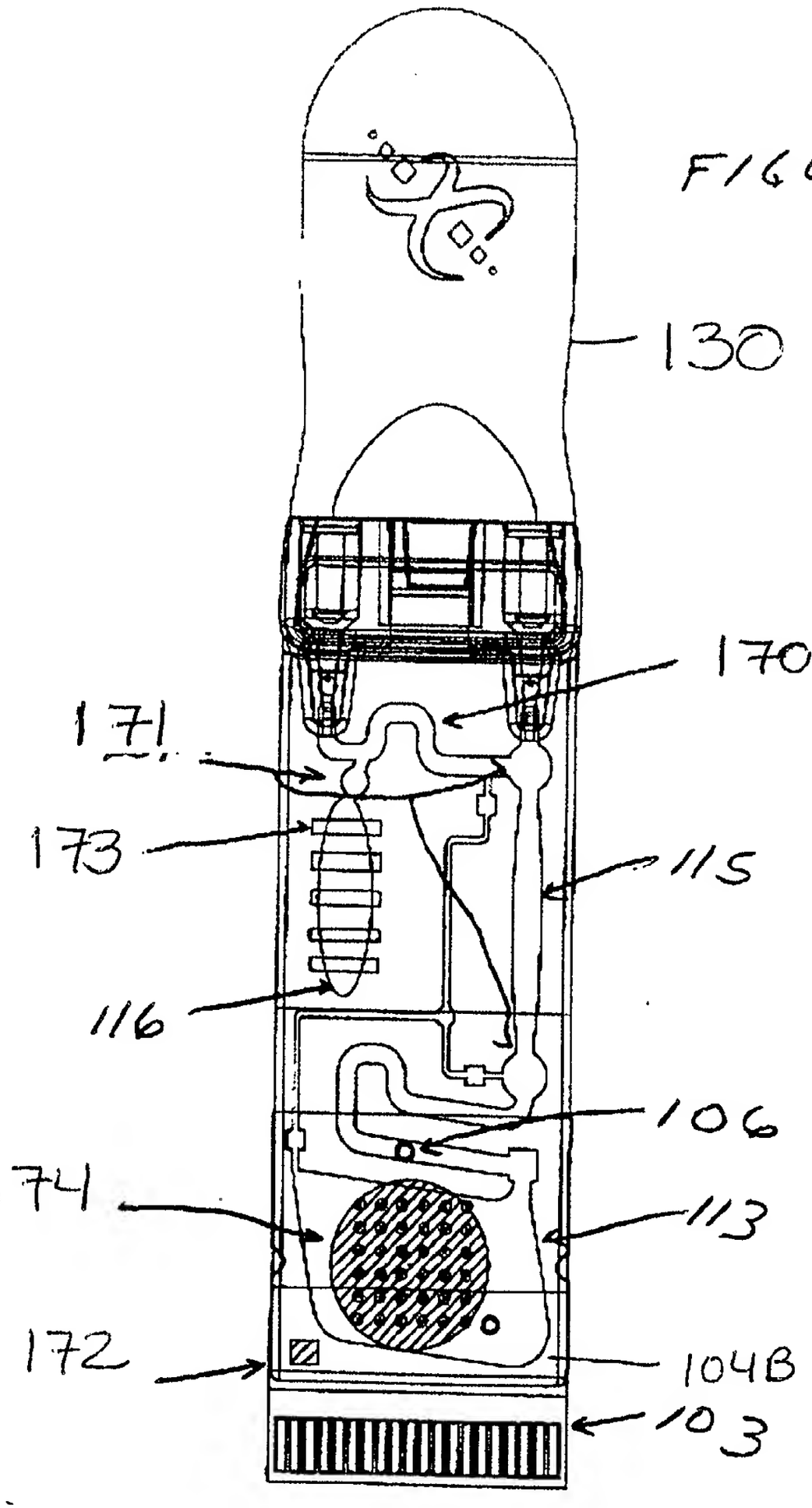
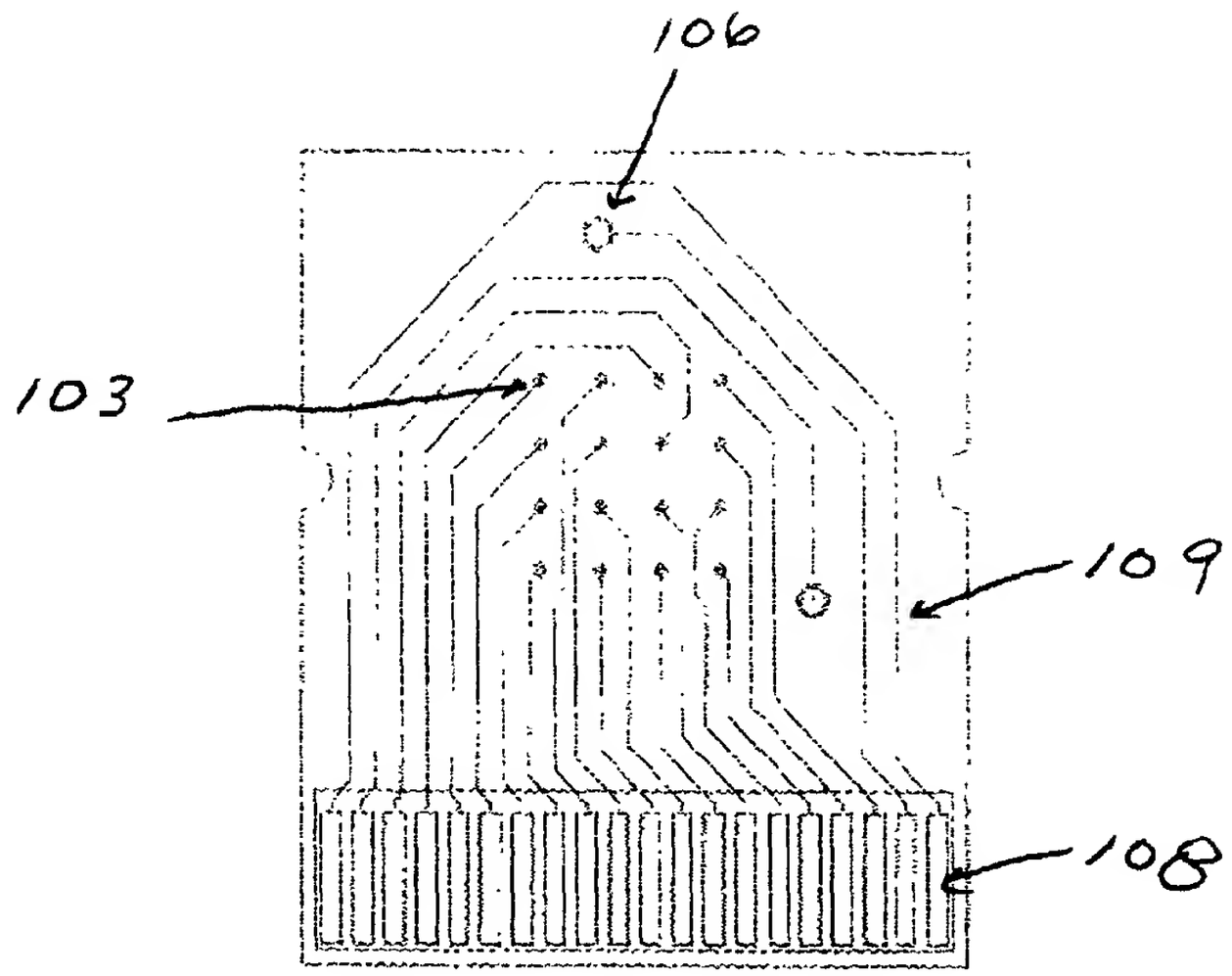


FIGURE 1H



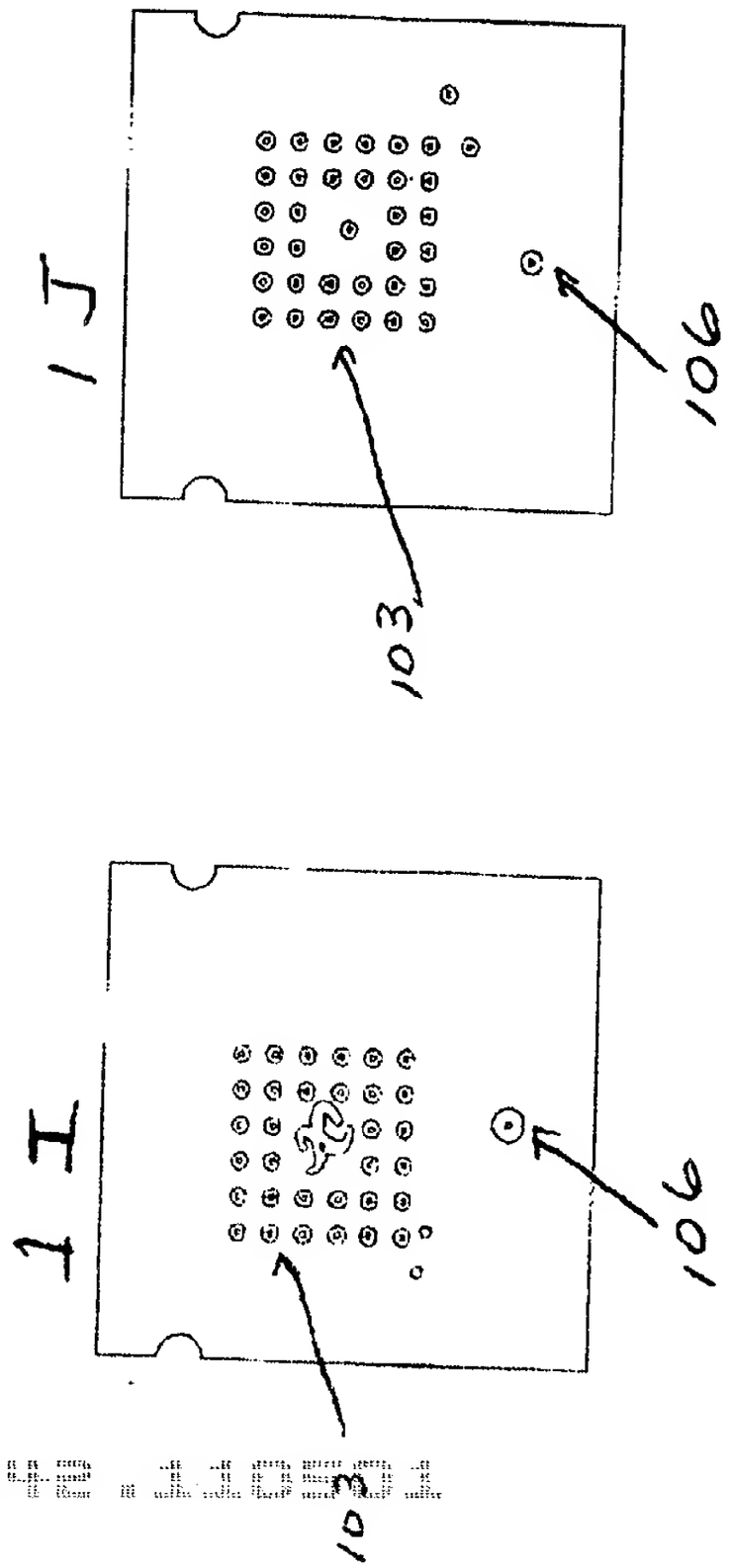
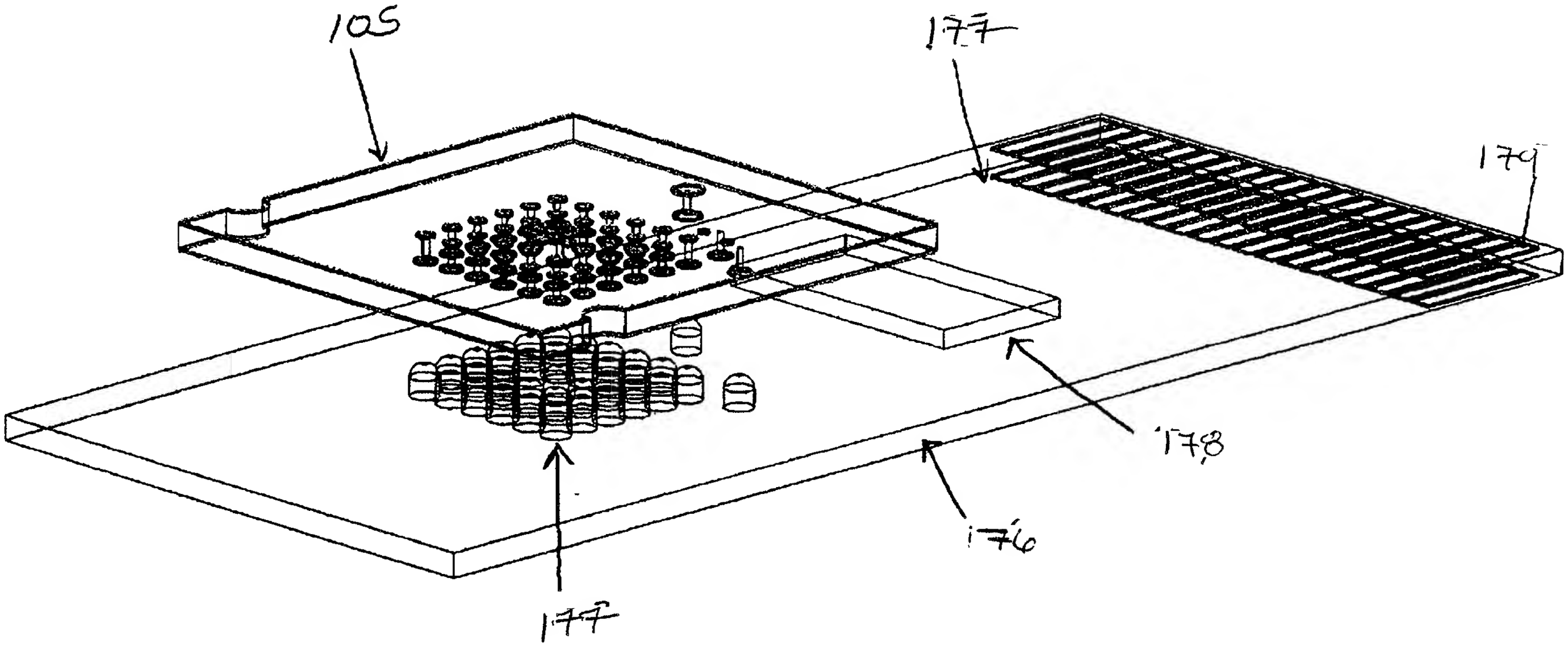

1 J
106
103
1 H
106
103

FIGURE 1K



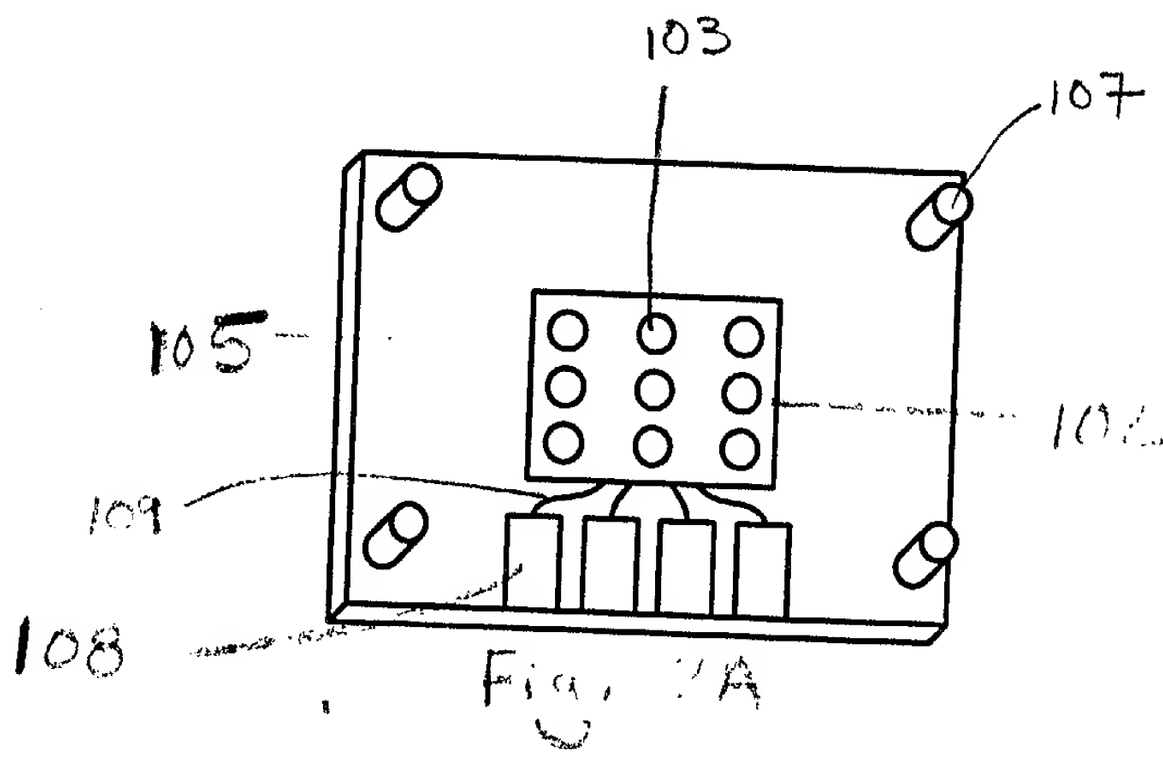


Fig. 2A

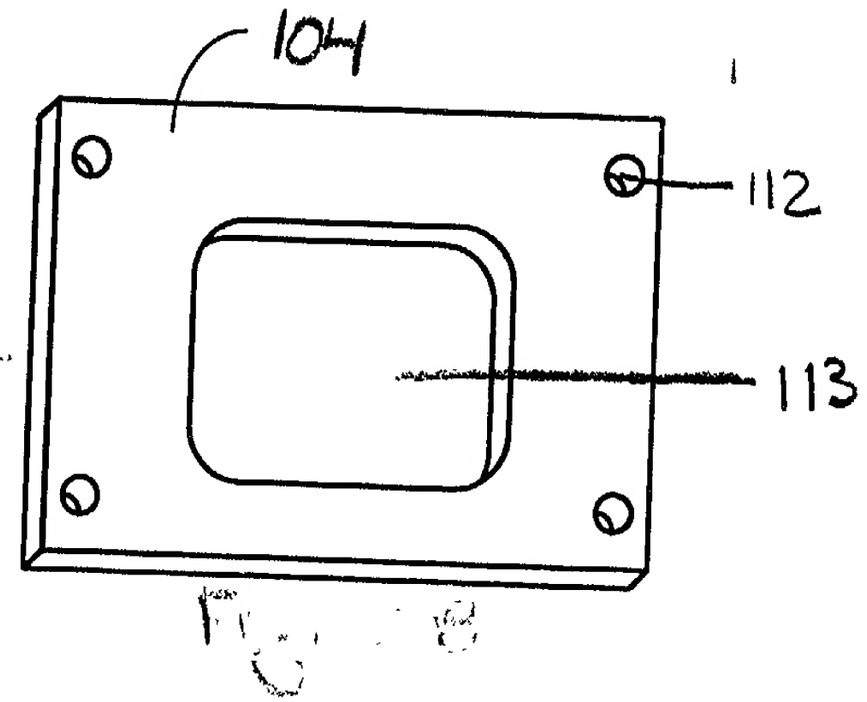


Fig. 2B

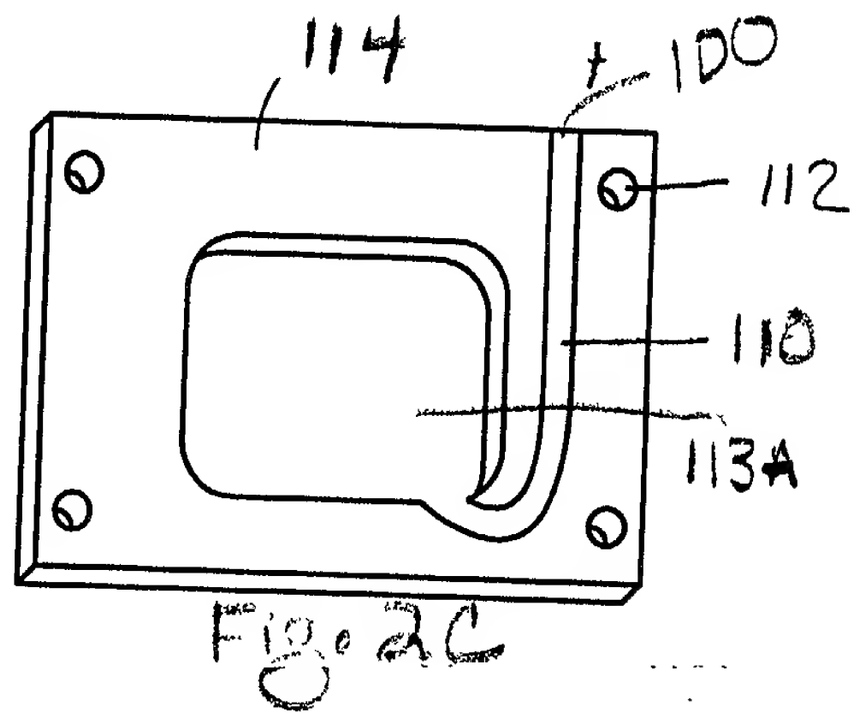


Fig. 2C

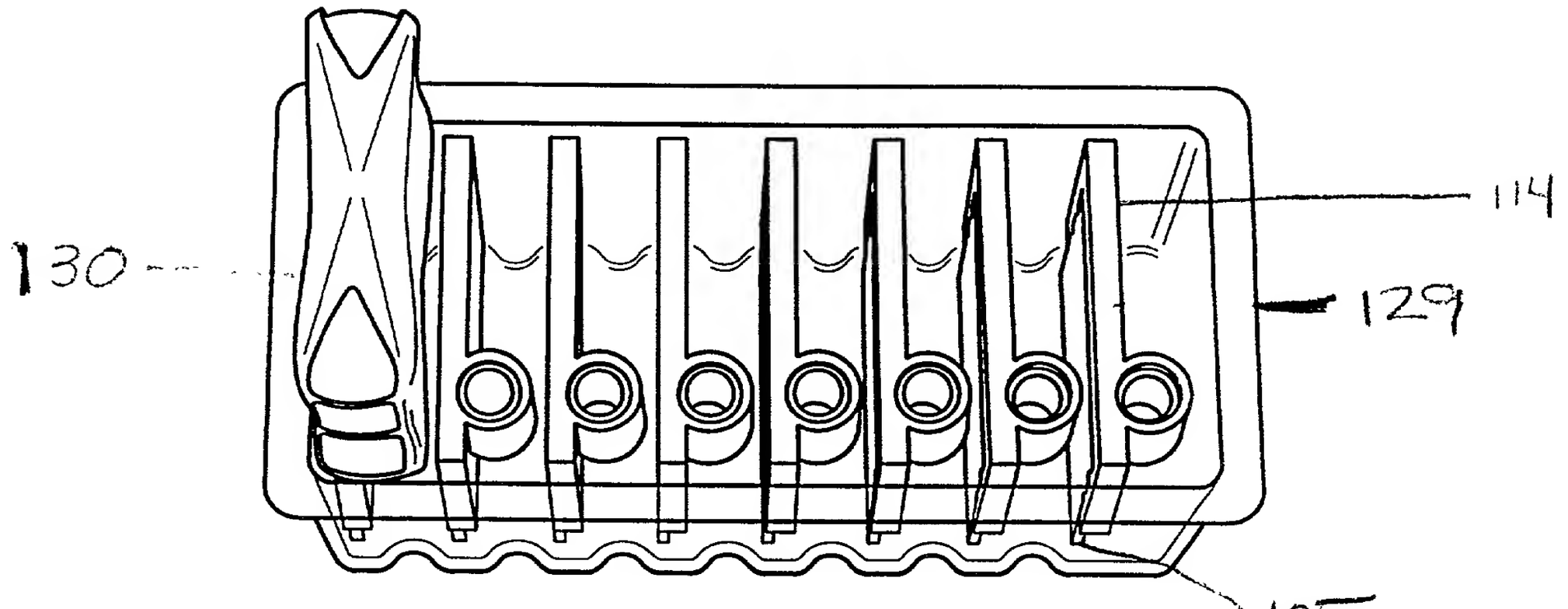


FIG._3 A

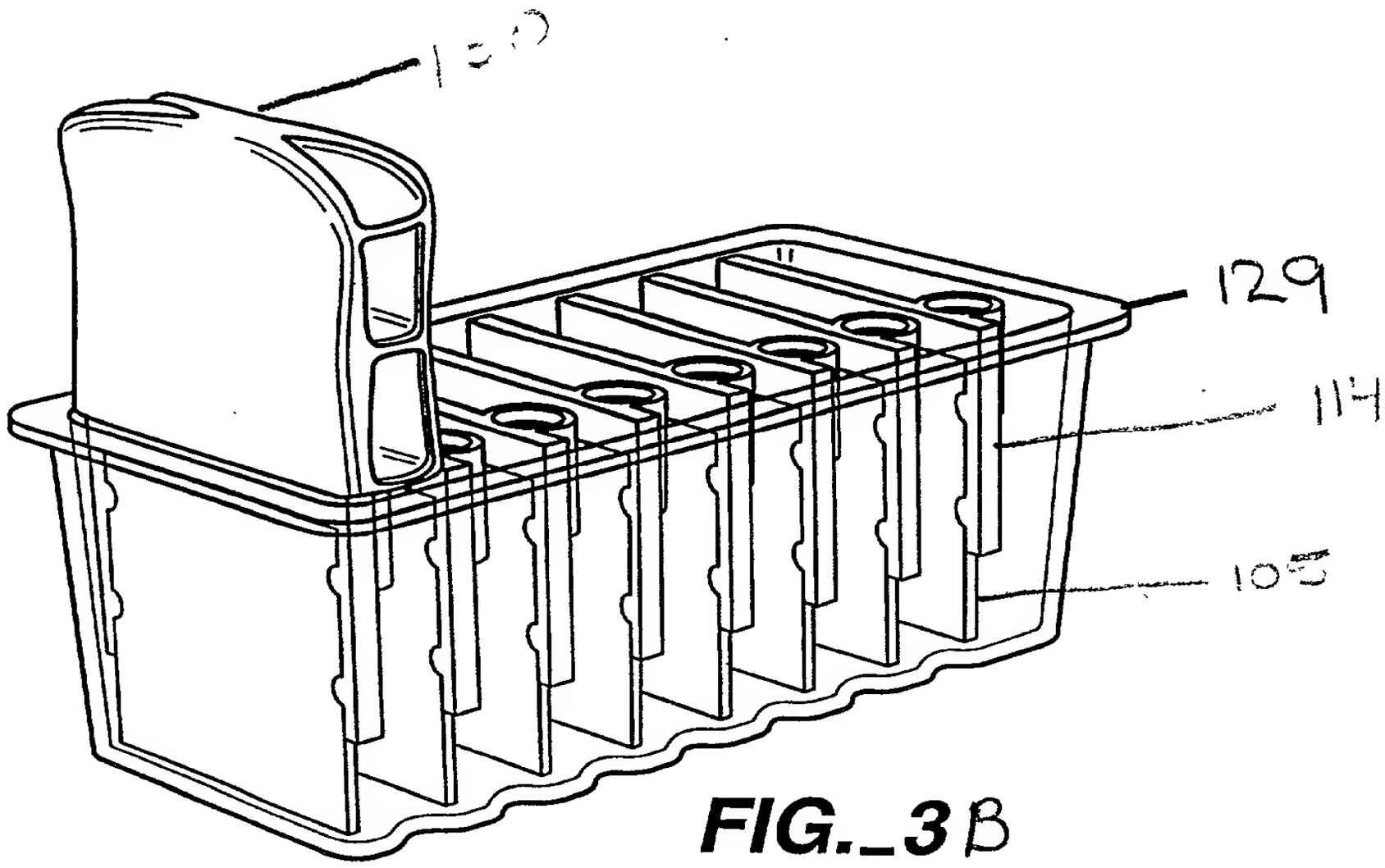
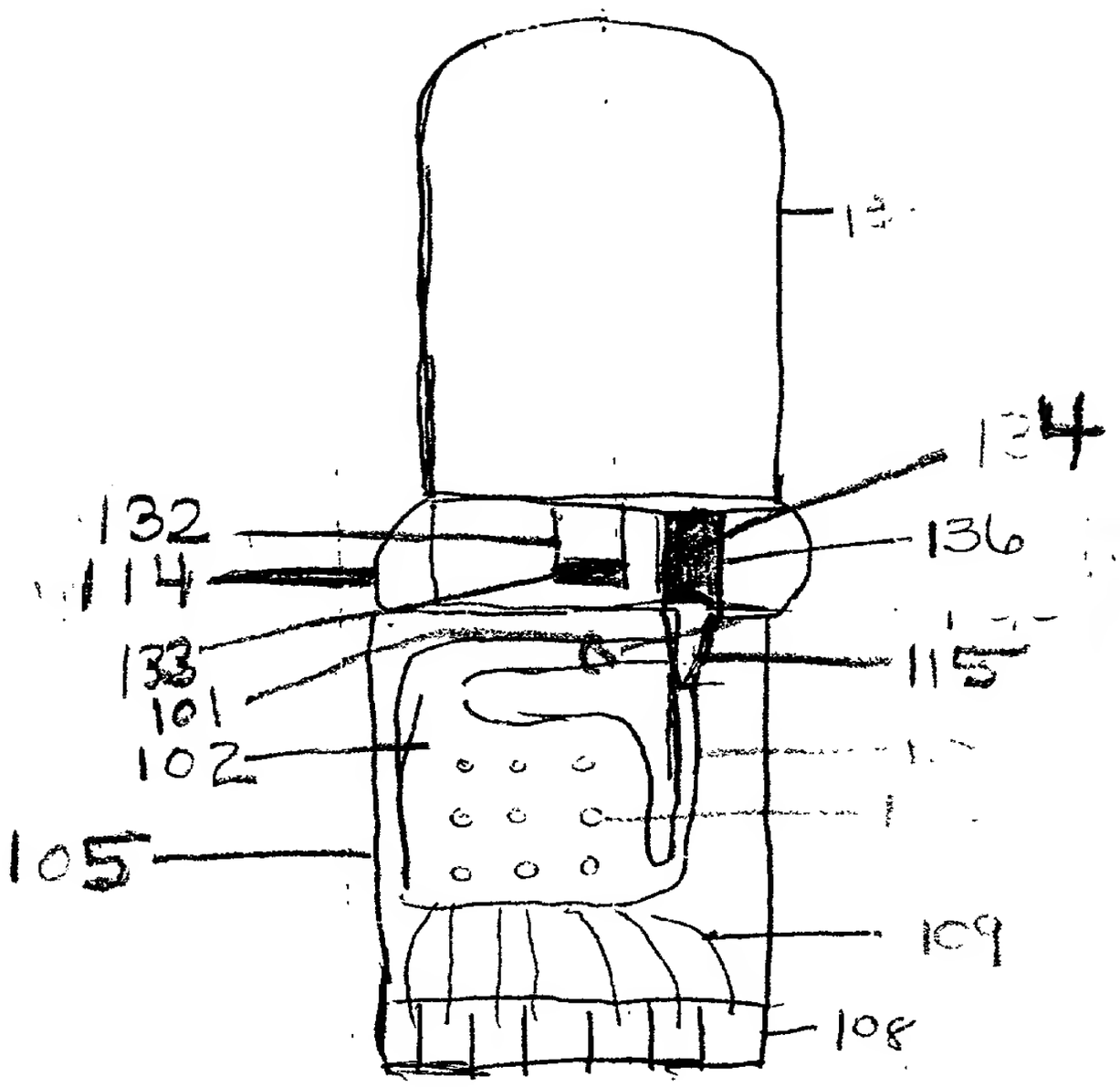


FIG._3 B



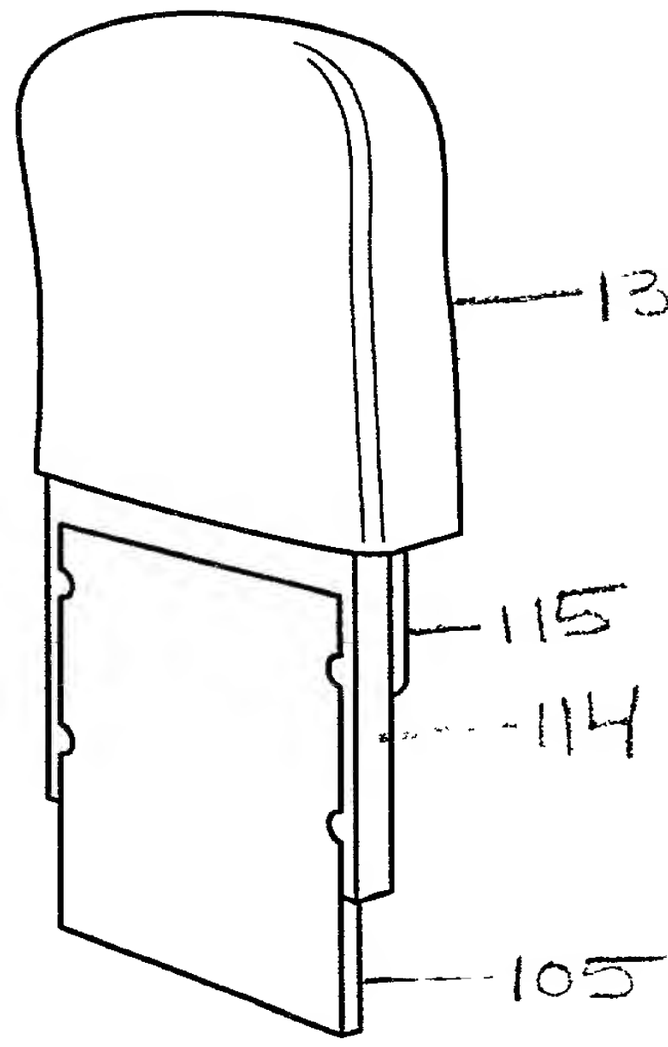


FIG._3D

Fig 3C

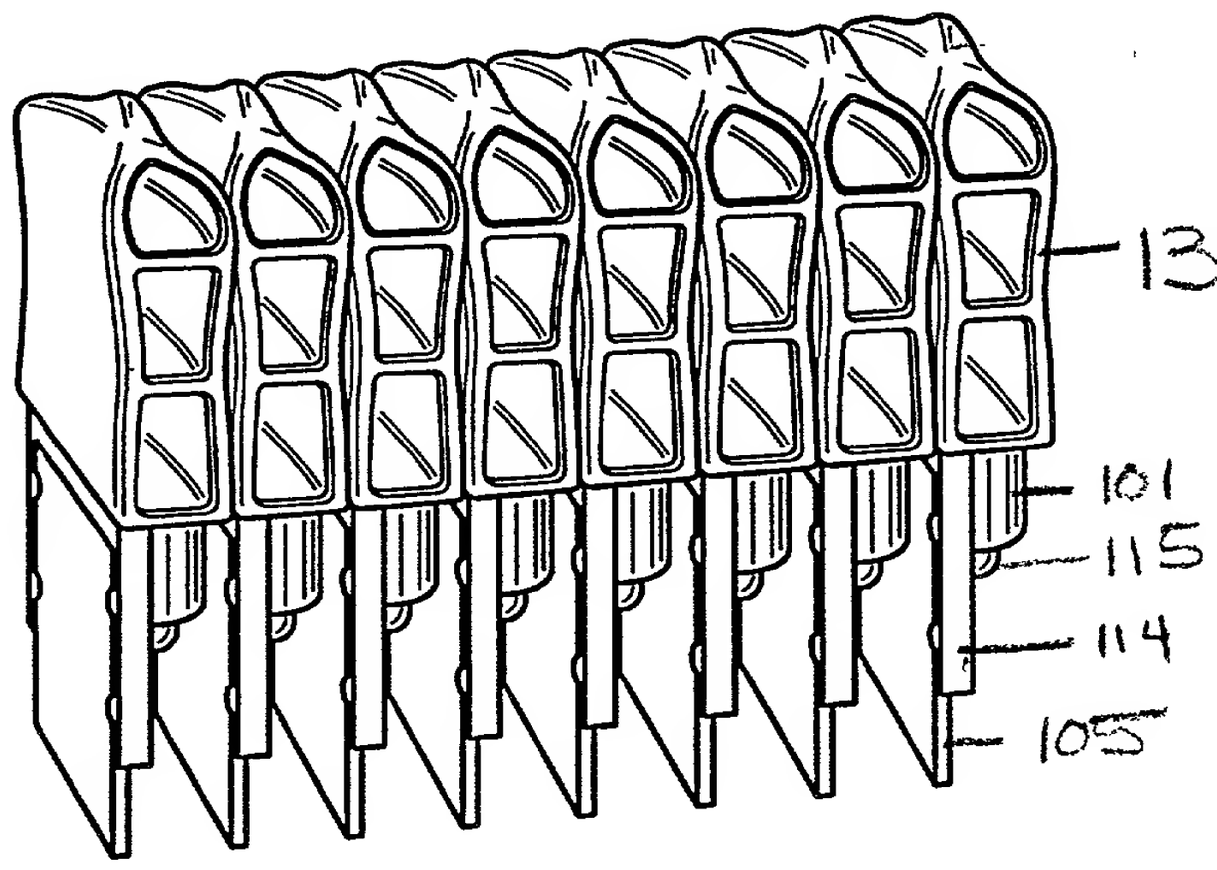


FIG._3E

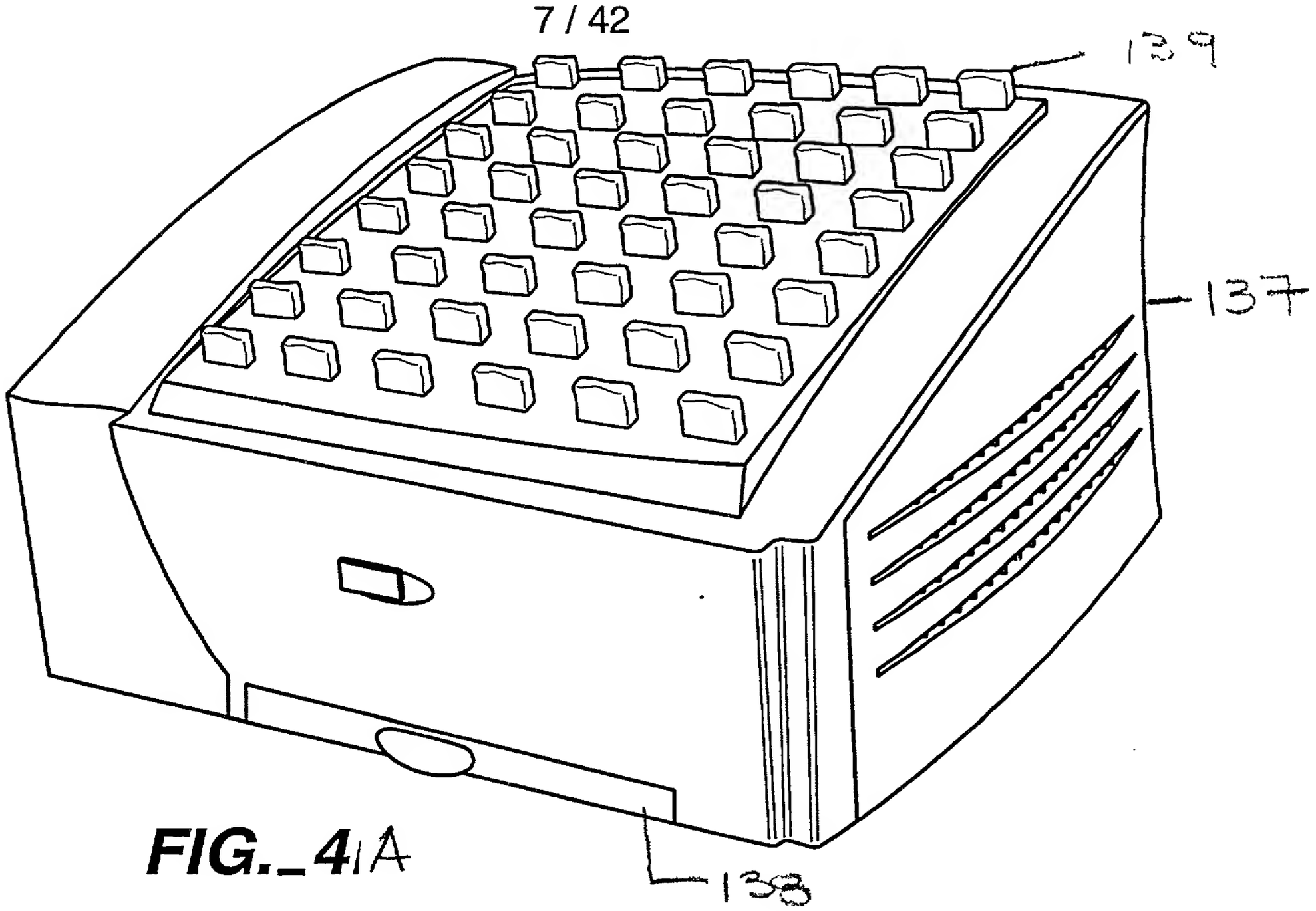


FIG._4A

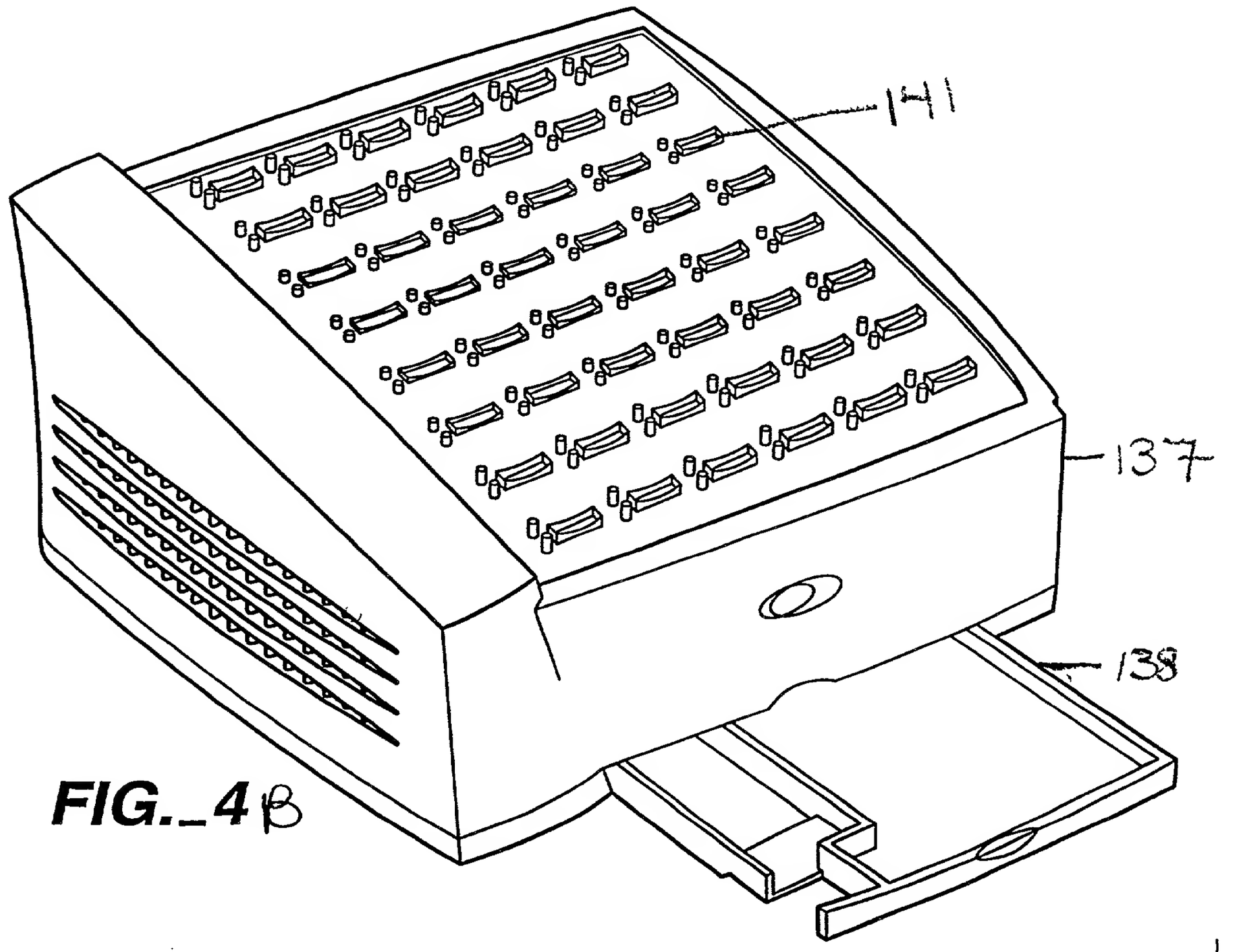


FIG._4B

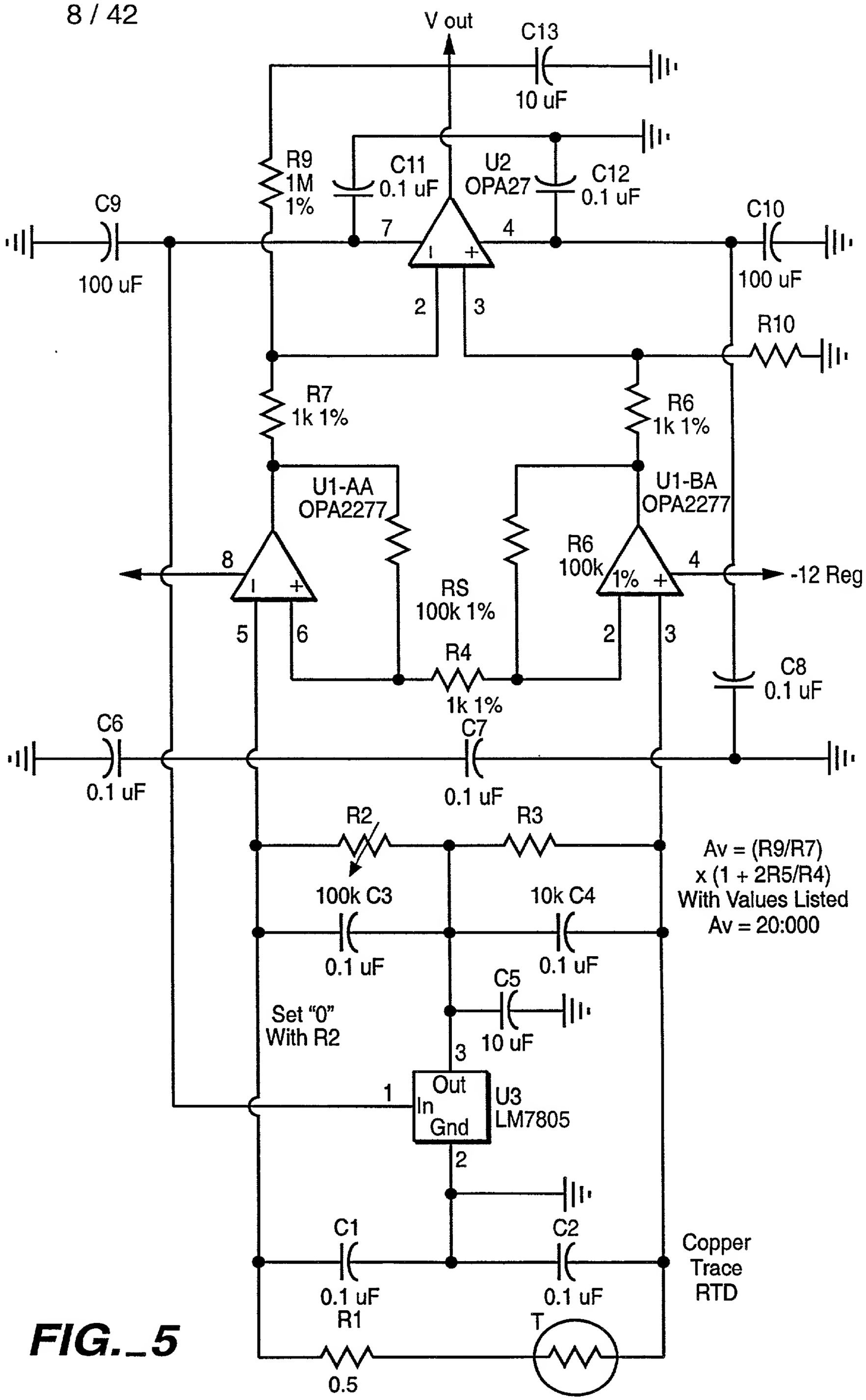

V out
C13
10 uF
R9
1M
1%
C11
0.1 uF
U2
OPA27
C12
0.1 uF
C9
100 uF
7
4
C10
100 uF
2
3
R10
R7
1k 1%
R6
1k 1%
U1-AA
OPA2277
U1-BA
OPA2277
8
R6
100k
4
-12 Reg
RS
100k 1%
5
6
2
3
R4
1k 1%
C8
0.1 uF
C6
0.1 uF
C7
0.1 uF
R2
R3
100k C3
10k C4
0.1 uF
0.1 uF
Av = (R9/R7)
x (1 + 2R5/R4)
With Values Listed
Av = 20:000
C5
10 uF
Set "0"
With R2
3
1
Out
In
Gnd
U3
LM7805
2
C1
C2
0.1 uF
0.1 uF
R1
T
0.5
Copper
Trace
RTD

FIG._5

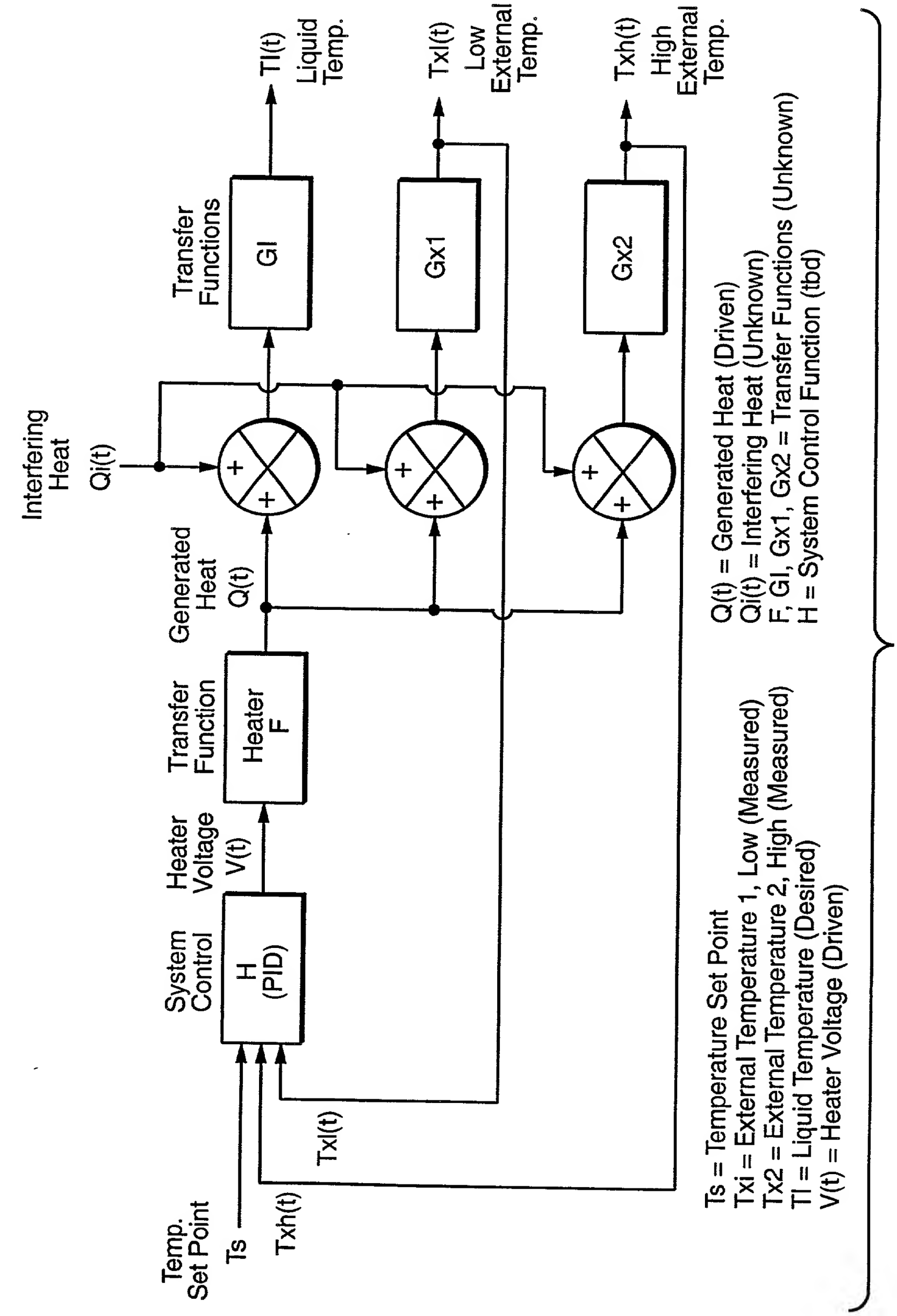

Temp.
Set Point
Ts
Txh(t)
Txl(t)
System
Control
H
(PID)
Heater
Voltage
V(t)
Transfer
Function
Heater
F
Generated
Heat
Q(t)
Interfering
Heat
Qi(t)
Transfer
Functions
GI
Gx1
Gx2
TI(t)
Liquid
Temp.
Txl(t)
Low
External
Temp.
Txh(t)
High
External
Temp.
Ts = Temperature Set Point
Txi = External Temperature 1, Low (M
Tx2 = External Temperature 2, High (
TI = Liquid Temperature (Desired)
V(t) = Heater Voltage (Driven)
Q(t) = Generated Heat (D
Qi(t) = Interfering Heat (U
F, GI, Gx1, Gx2 = Transfer Functions (Unknown)
H = System Control Function (tbd)

FIG._6

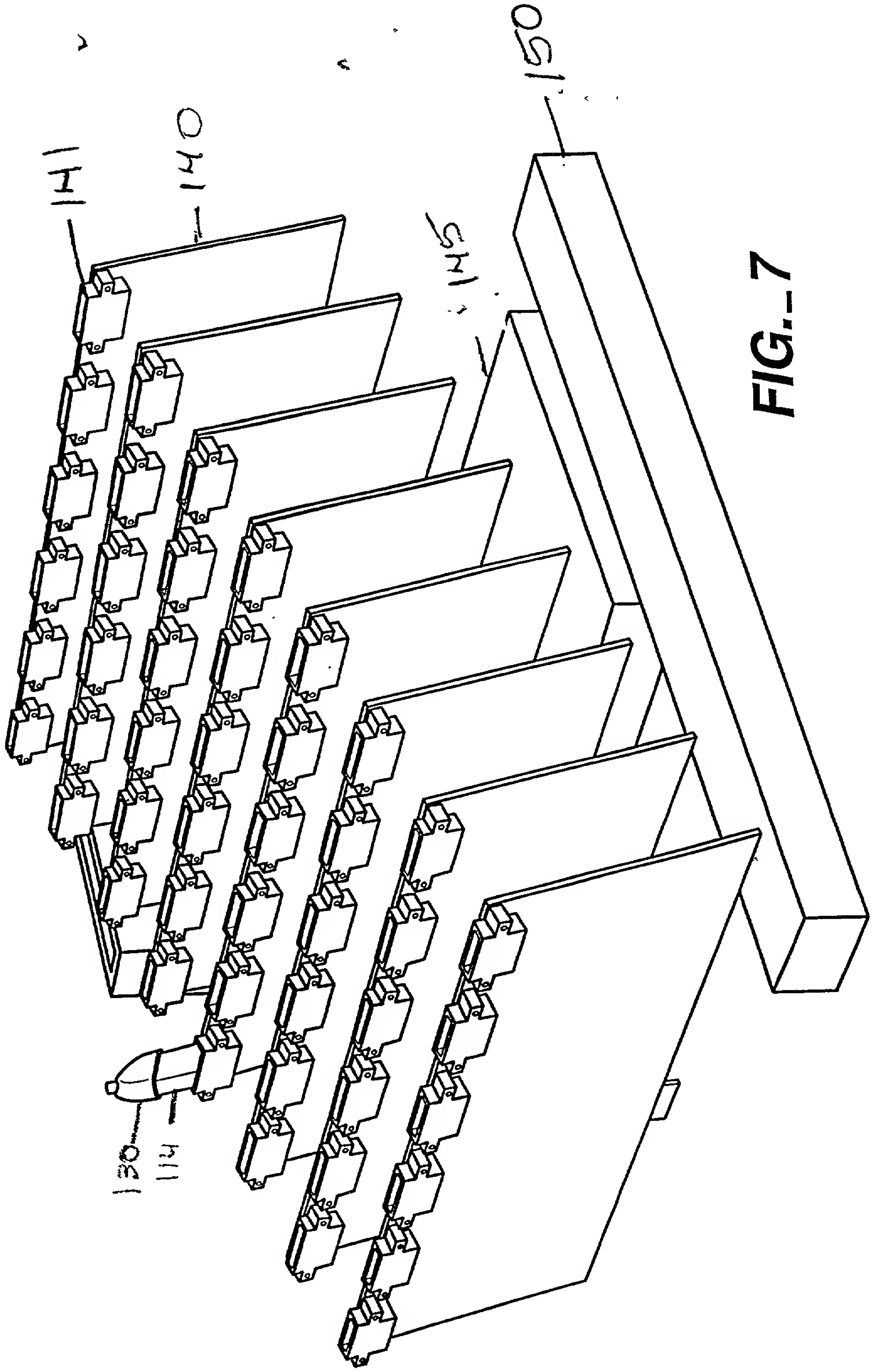


FIG._7

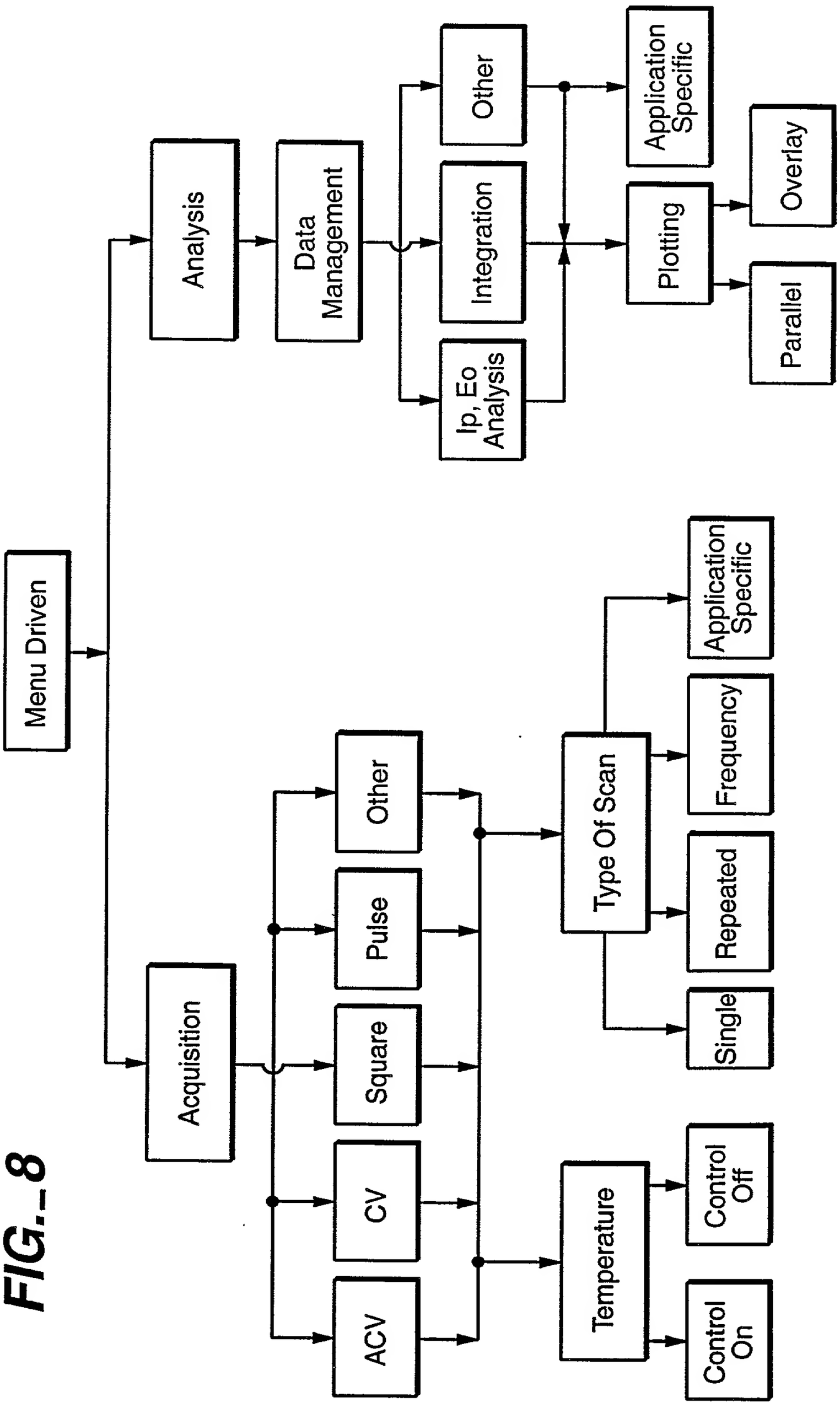

Menu Driven
Analysis
Data Management
Other
Integration
Ip, Eo Analysis
Application Specific
Plotting
Overlay
Parallel
Acquisition
Pulse
Other
Square
CV
ACV
Type Of Scan
Frequency
Repeated
Single
Application Specific
Temperature
Control Off
Control On

FIG._8

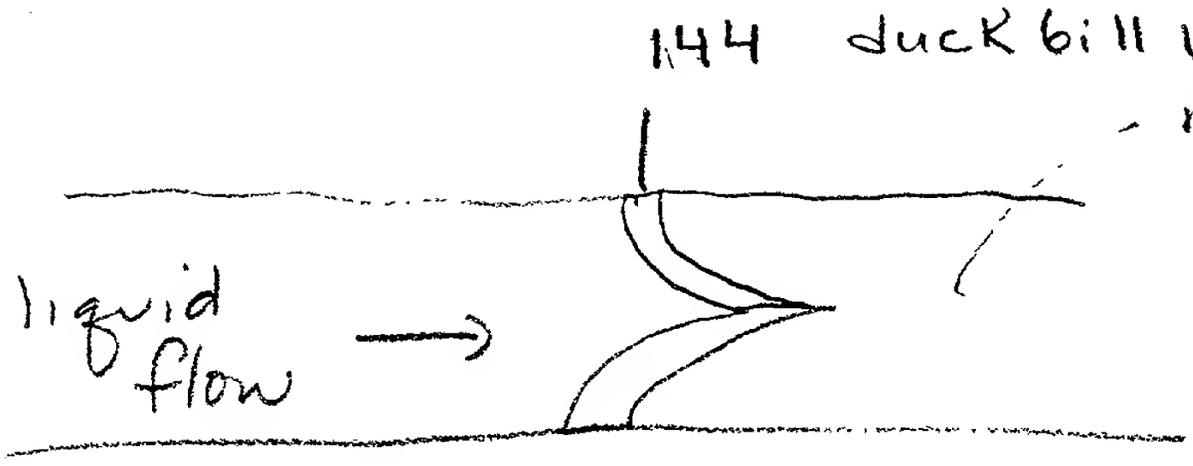


Fig 9A

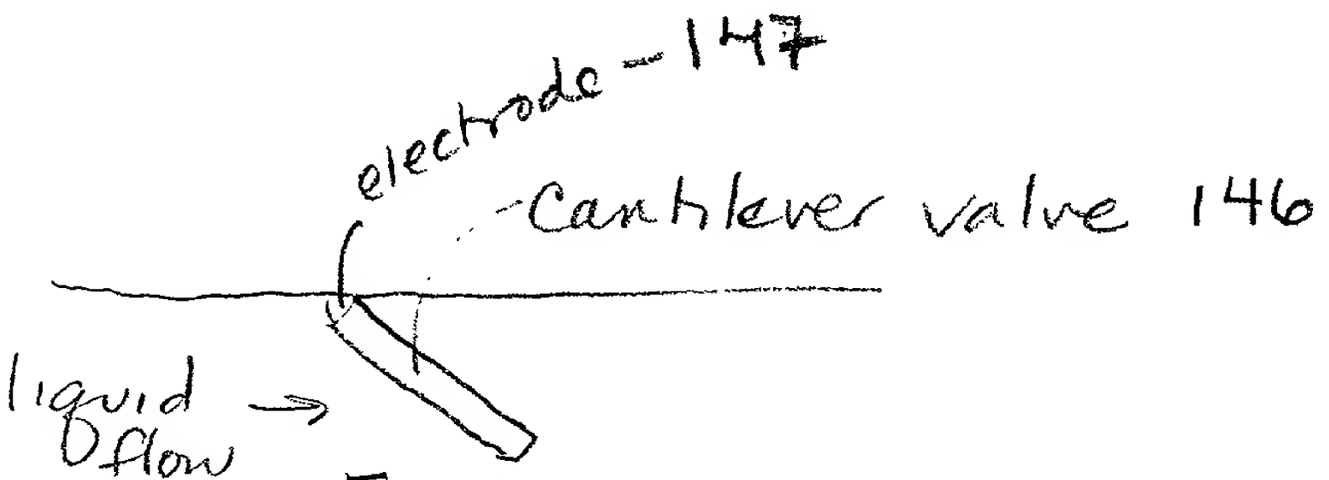


Fig 9B

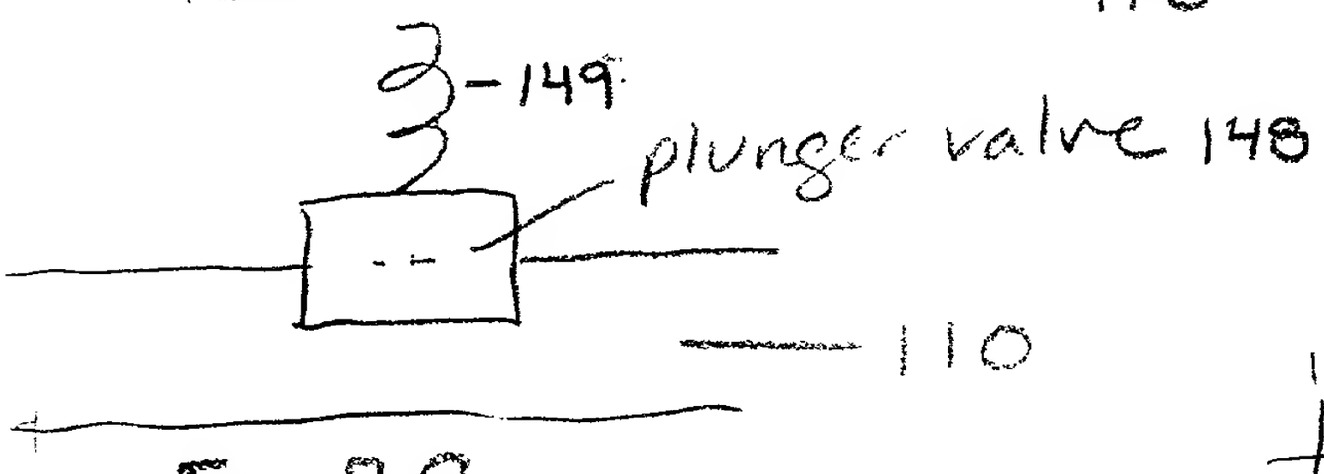


Fig 9C

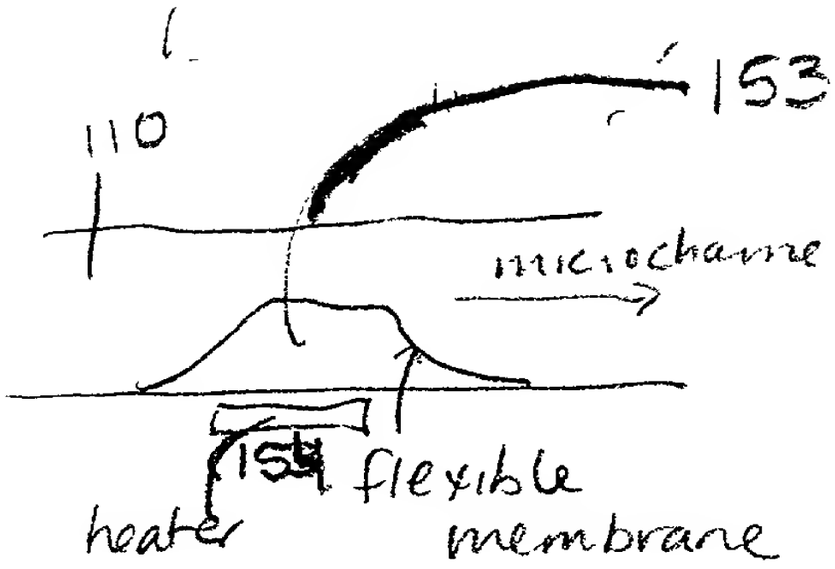


Fig 9F

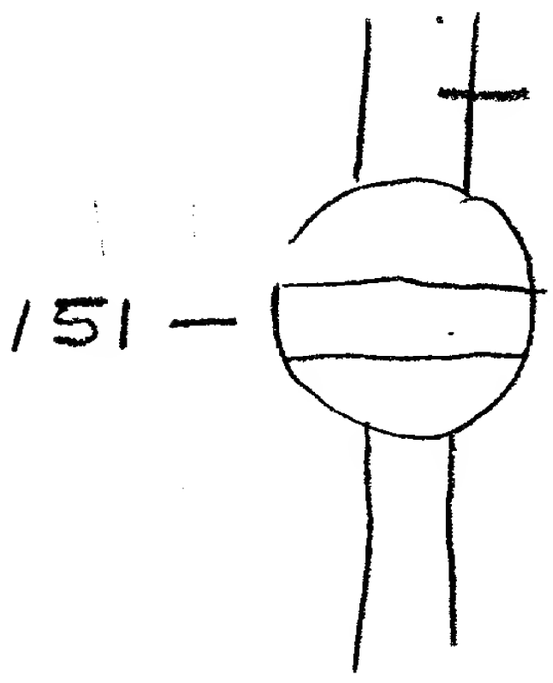


Fig 9D

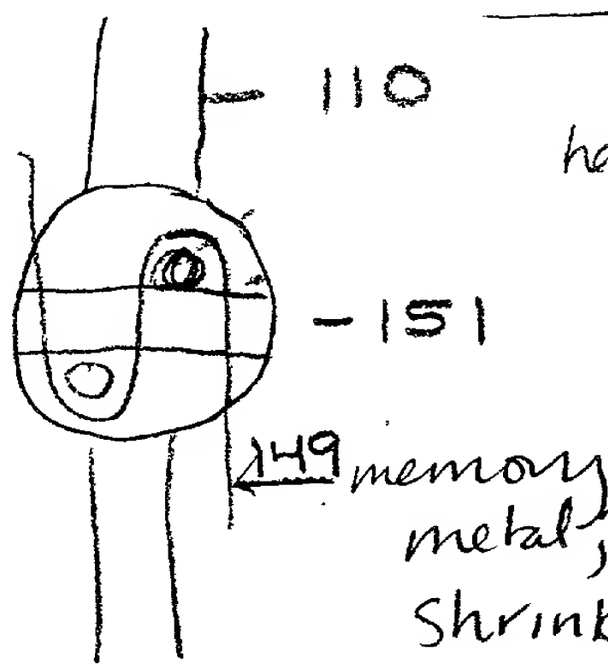


Fig 9E

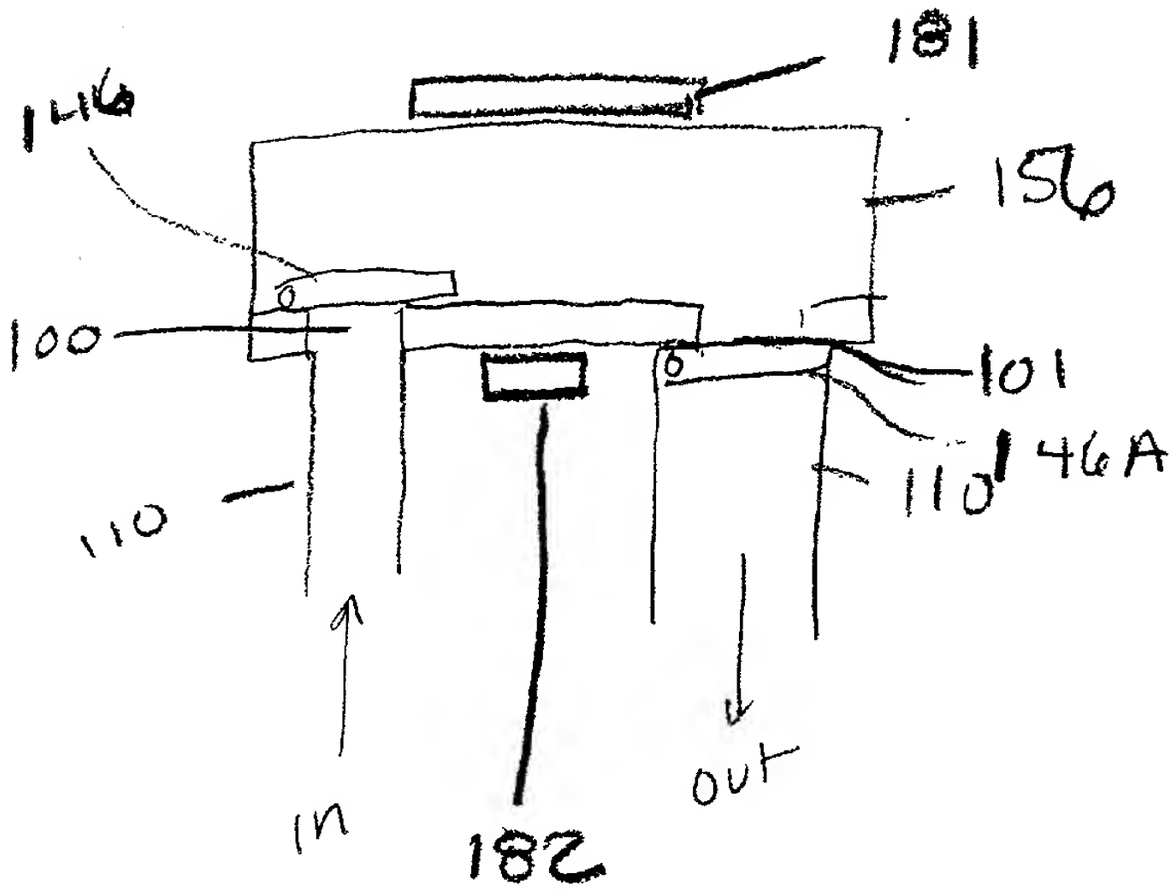


Fig 9G

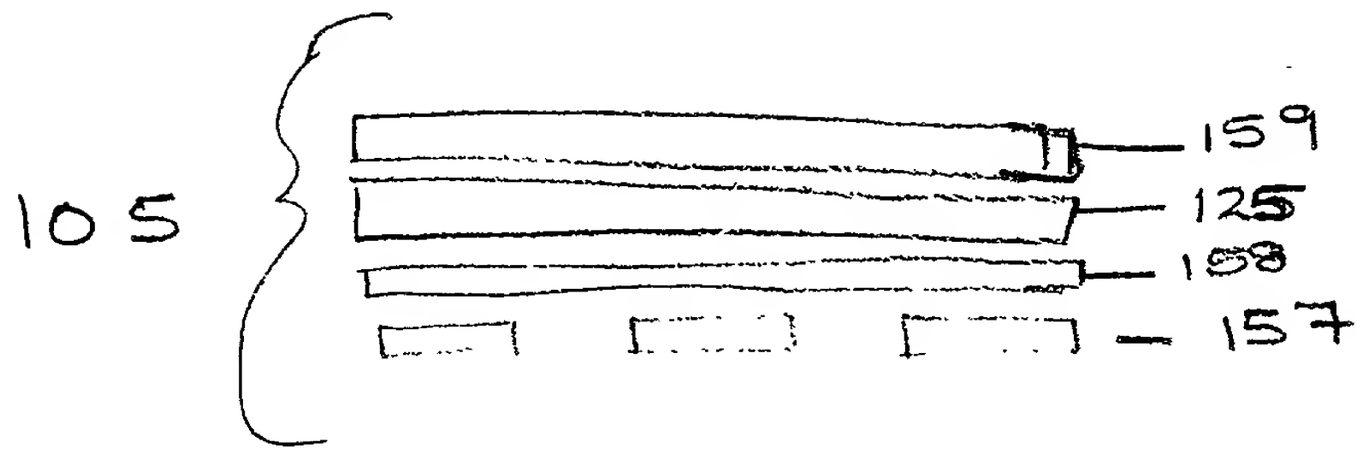


Fig. 10 A

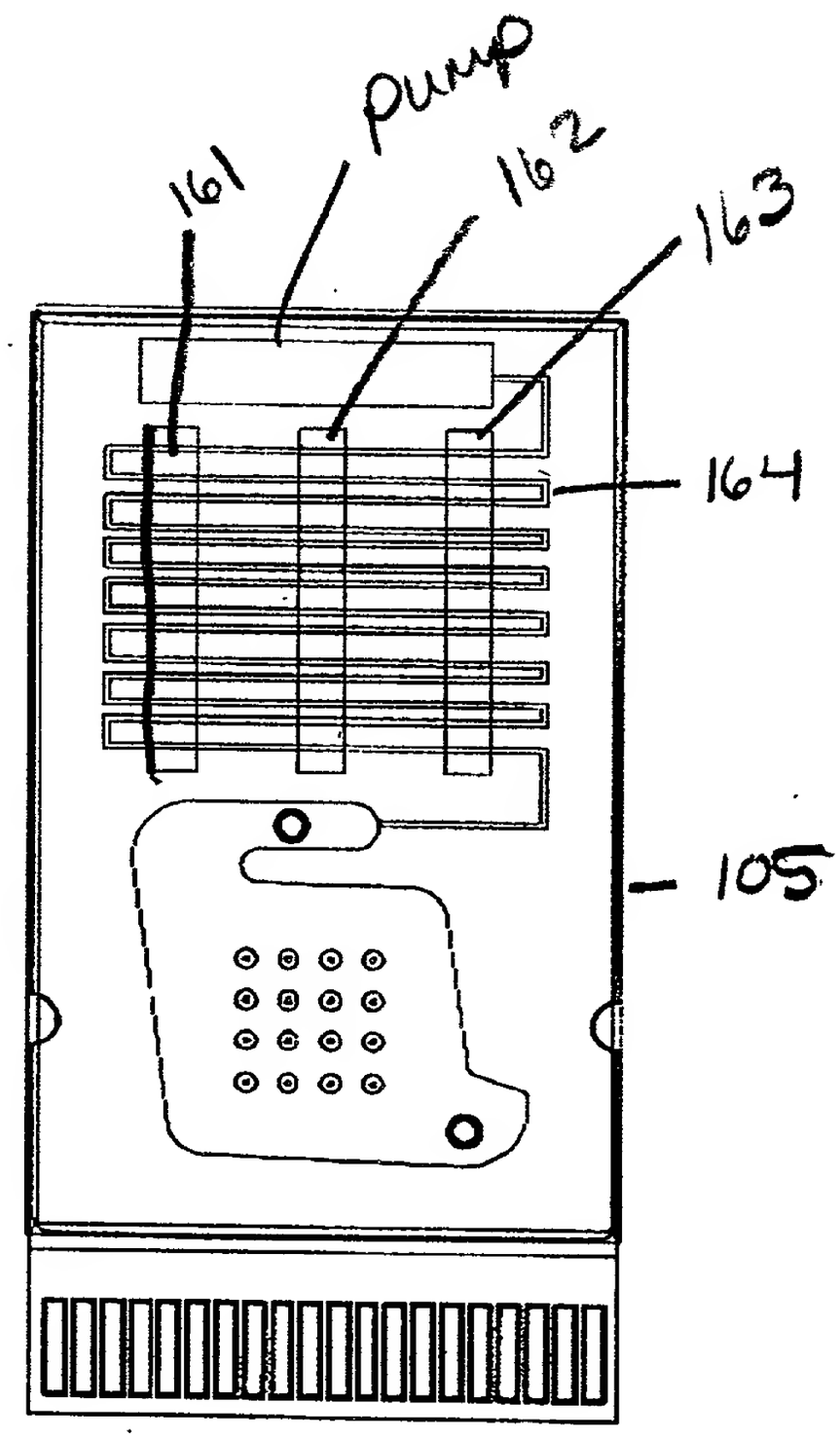


Fig 10 B

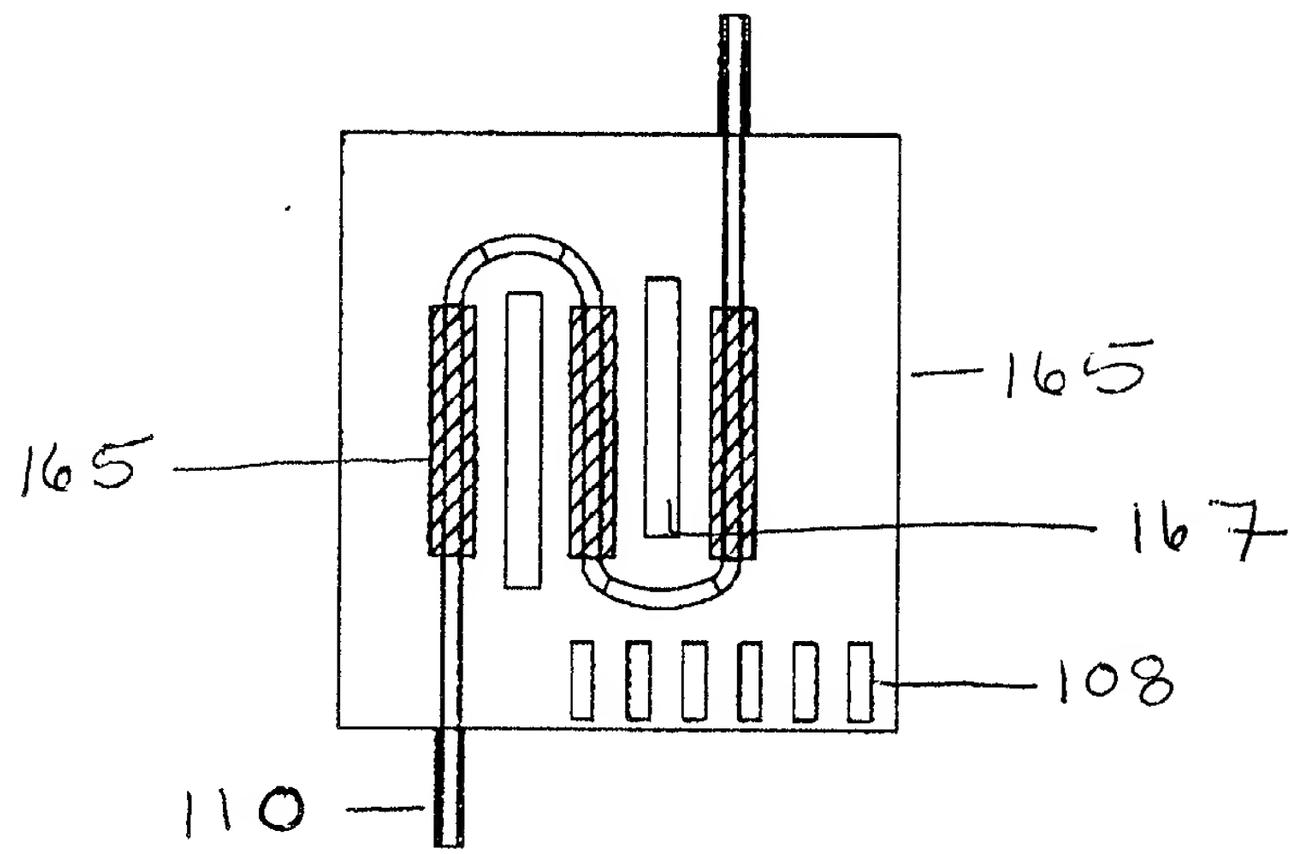


Fig 10C

- Bar coded "reference" sheet, stored in tray under unit, with bar coded protocols, bar coded well and slot id's, bar coded commands (e.g. "cancel", "done", etc.)
- Standard bar code wand (preferably with built-in decoder), housed in the tray (hence hidden when not in use)
- Serial (RS-232/485) interface (preferred), or "keyboard wedge"
- Multi-code support (Code 39, Code 128, etc.)
- Bar code on chip carrier (1 code per "8 pack"), identifying test, batch, etc.
  - Peel off labels, with same code as on carrier, with each "8 pack"

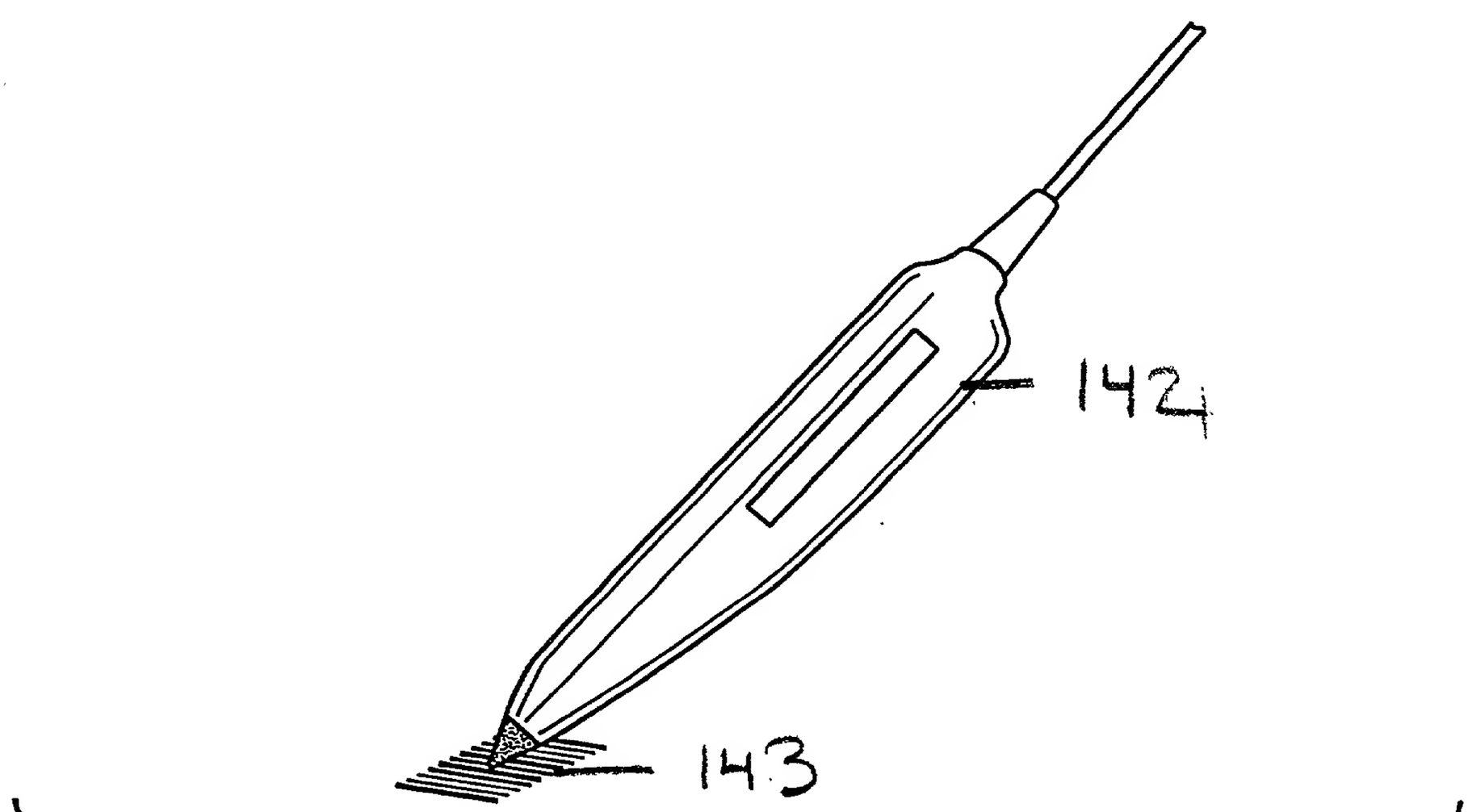


FIG._11

- Bar code usage scenario
  - User fills "8-pack" (all 8, or partially) from a 96 well plate, or from individual sample containers (PCR tubes, vaccutainers, etc.)
  - Pull out tray (with bar code reference sheet) and grab wand
  - Scan "start" code
  - Scan protocol code from sheet (will remain in effect until "done" is scanned)
  - Scan chip code from carrier (will remain in effect until "done" is scanned)
  - For each cartridge, user will
    - insert the cartridge in an open slot. Unit senses new chip automatically
    - scan the sample ID by either
      - scanning 96 well plate bar code from plate and well code from sheet
      - or scanning unique sample ID from container
      - or scanning "no ID" from reference sheet
  - Scan "done" code. The protocol can' now be started on these cartridges

FIG._12

- Bar code concept benefits
  - No keyboard entry (all-routine setup can be entered via bar coding)
  - All routine entries accomplished while in front of unit (no going back & forth between PC & Hydra)
  - All bar code entries done from small, flat surface in front of unit
  - No need to label each chip or each slot (which would compromise appearance)
  - Uses small unobtrusive bar code wand, hidden when not in use
  - Is flexible with respect to sample container (tube, 96 well plate, etc.), chip usage (by row of 8, or by individual chip), and lab bar coding method

FIG._13

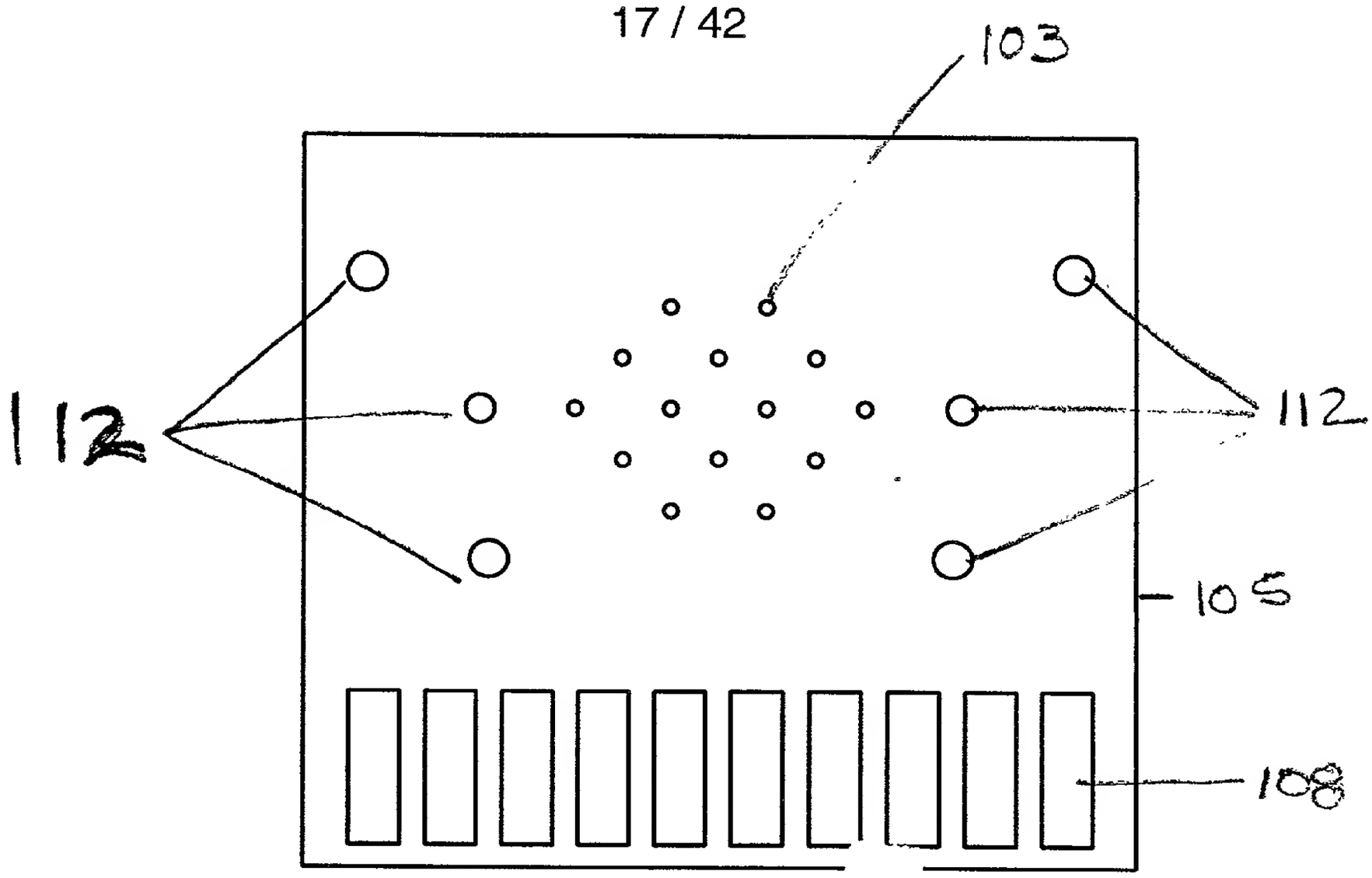


FIG._14A

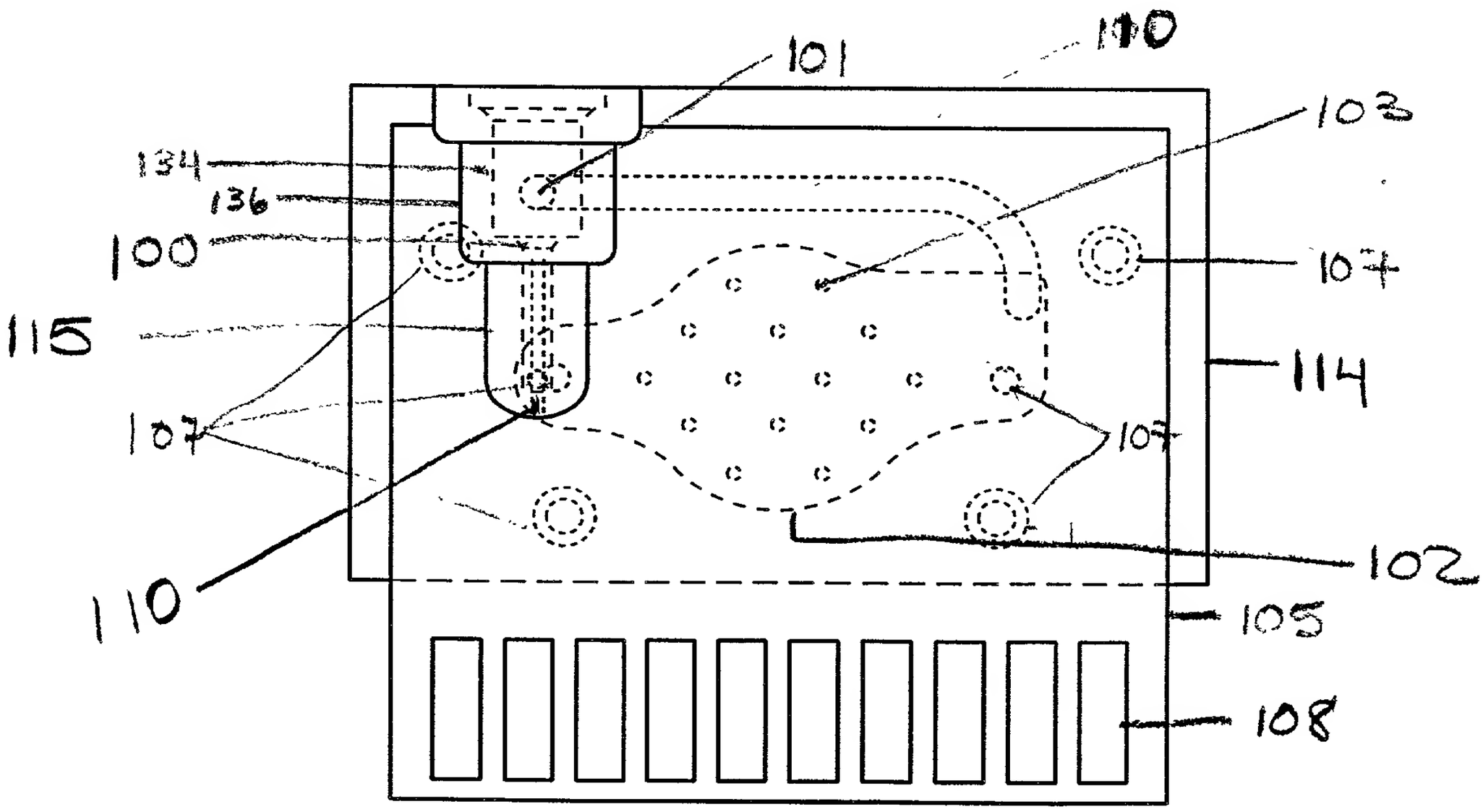


FIG._14B

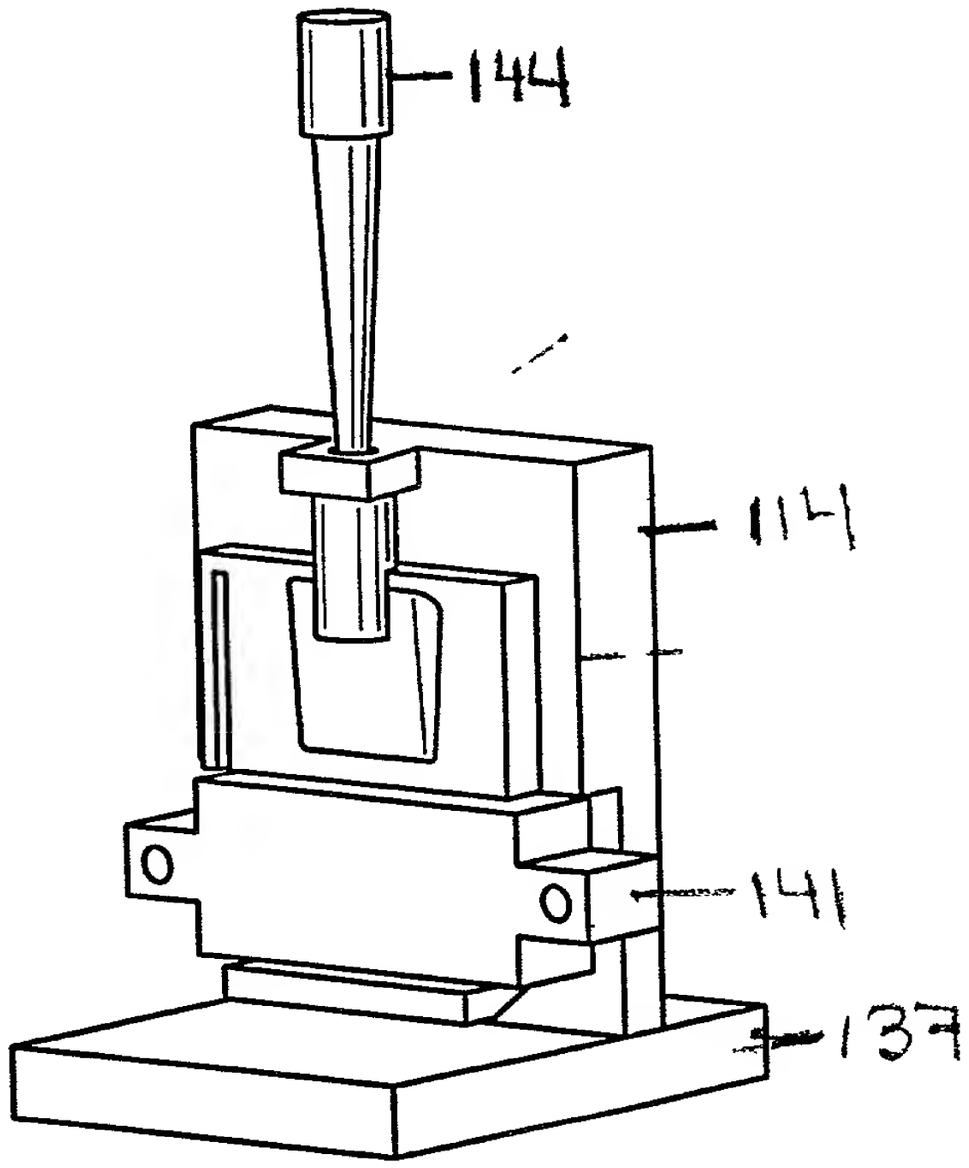


FIG._15A

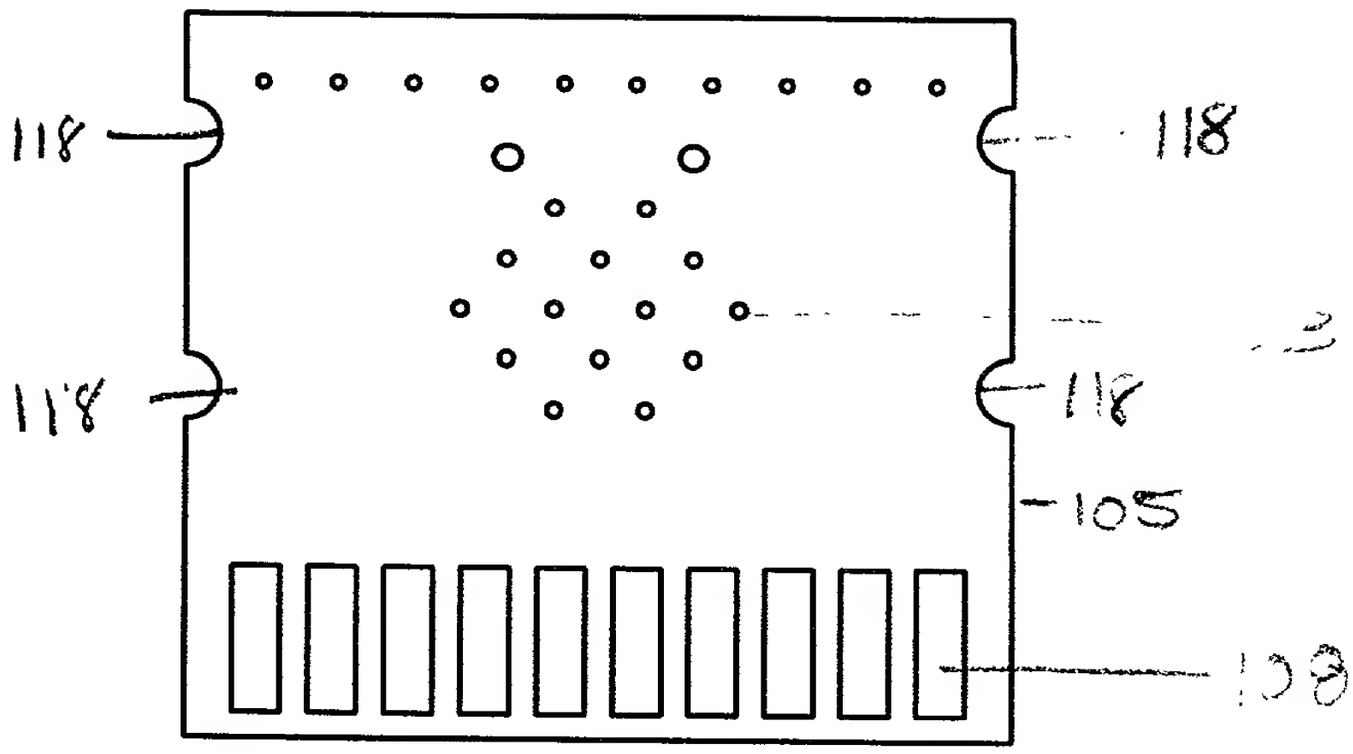


FIG._15 B

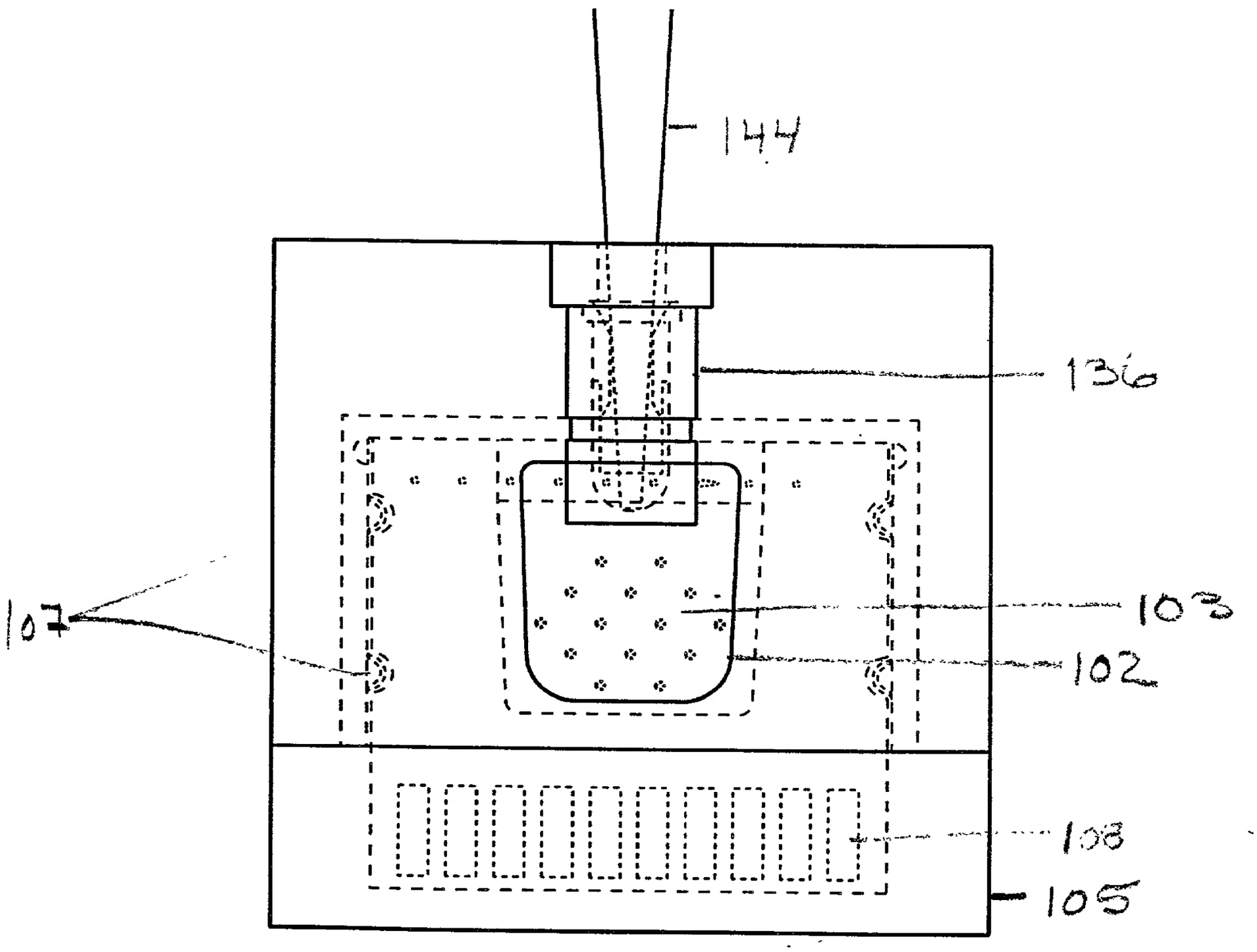


FIG._15 C

A Sine Wave And Its Corresponding Vector Notation

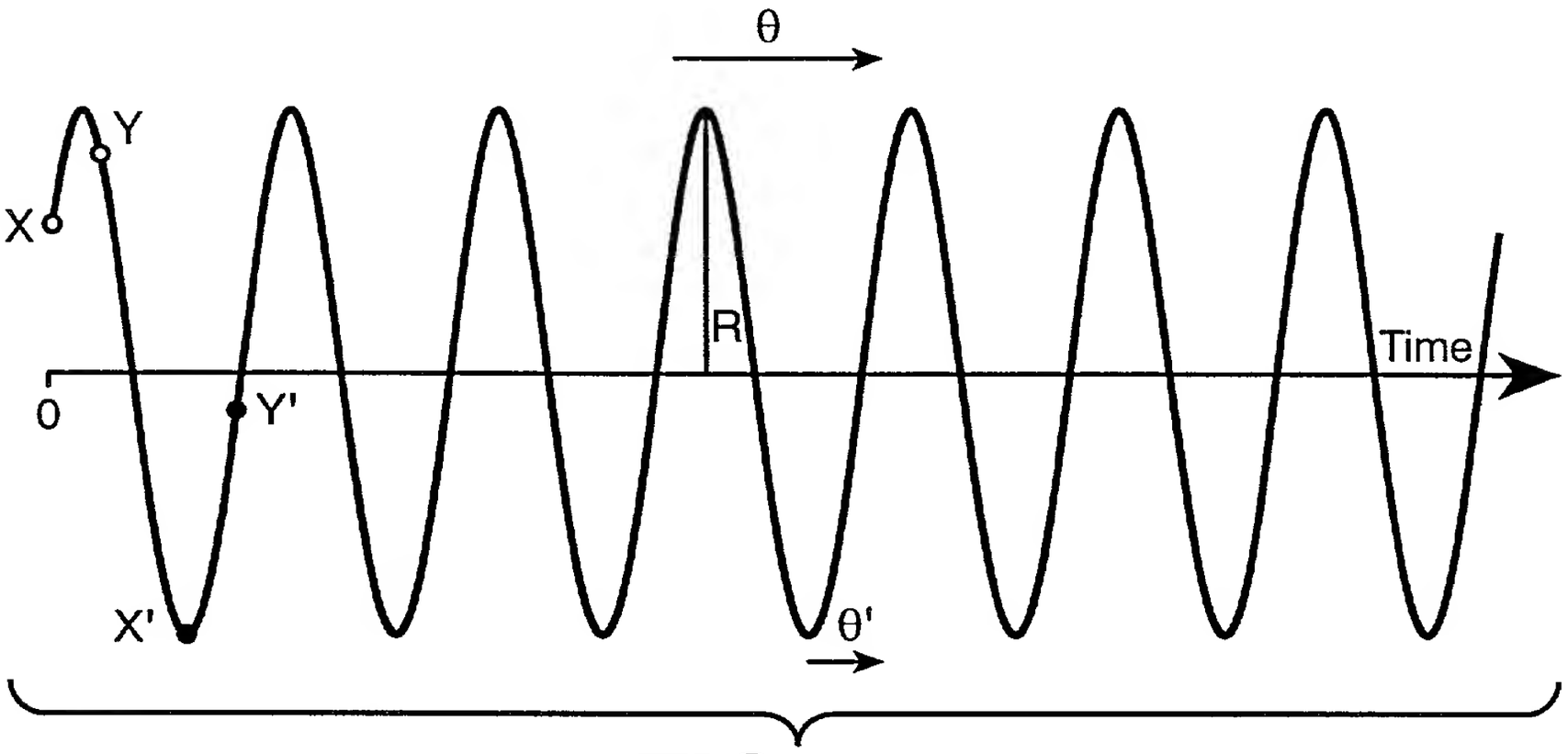


FIG._16

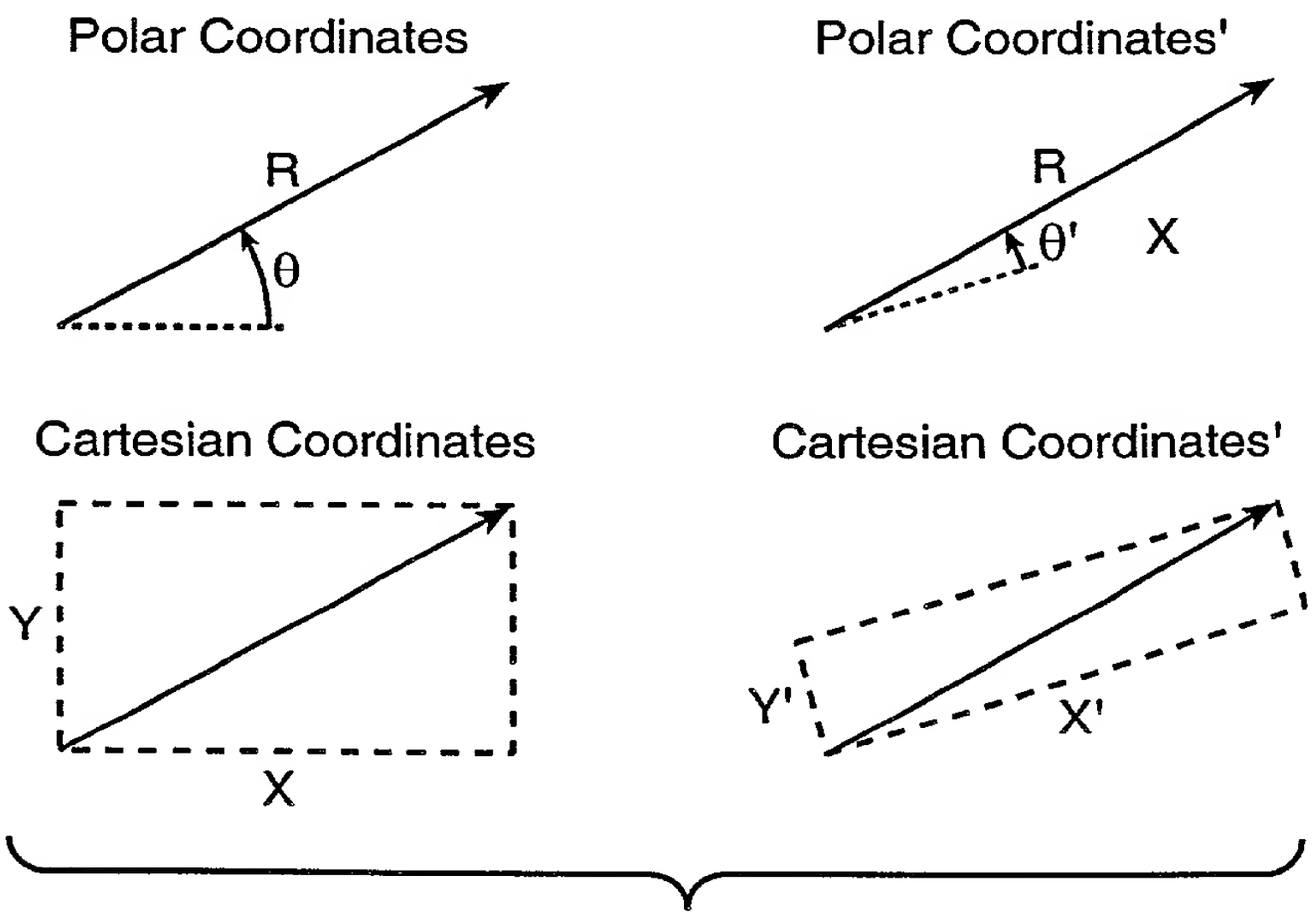


FIG._17

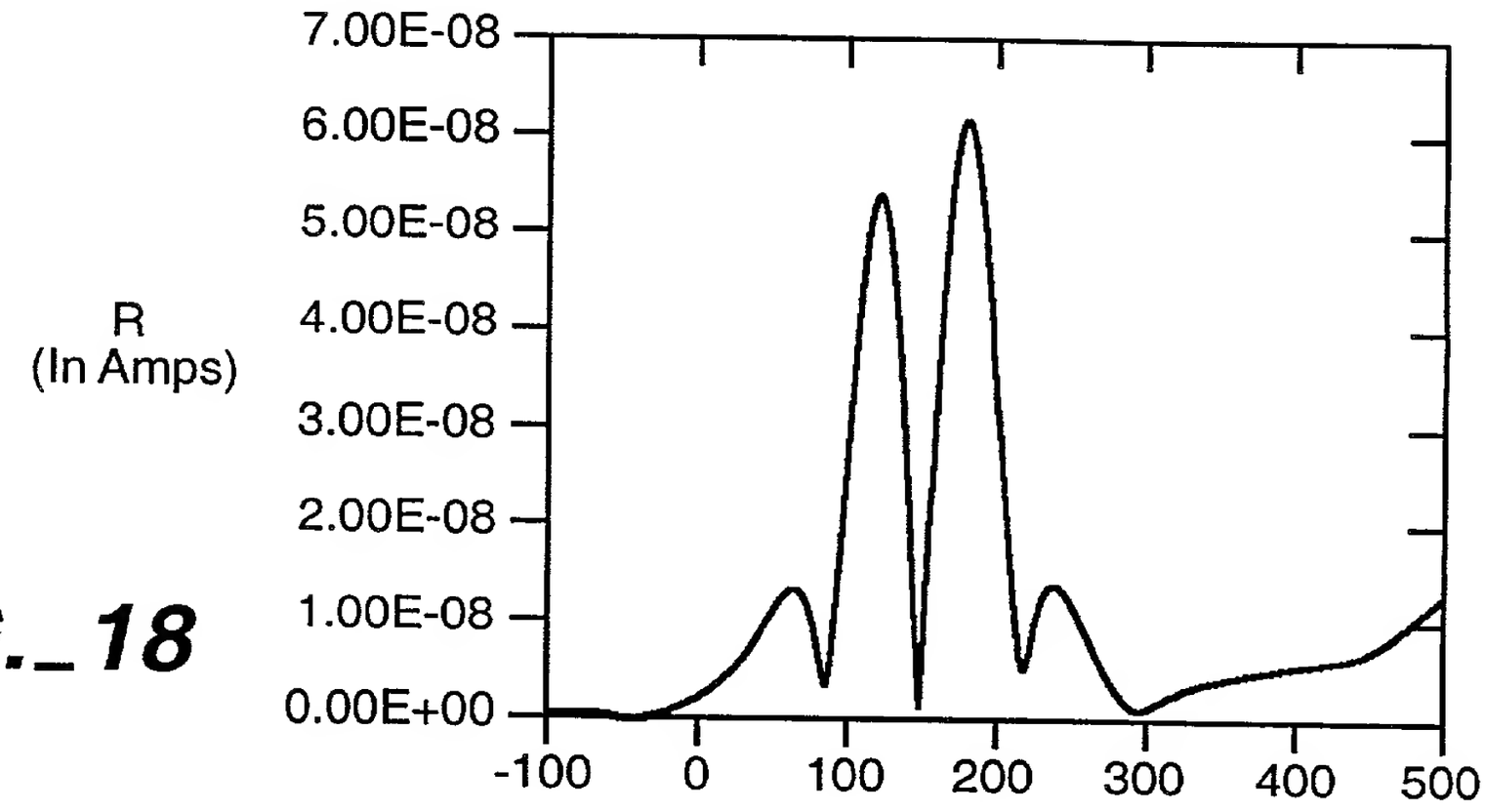


FIG._18

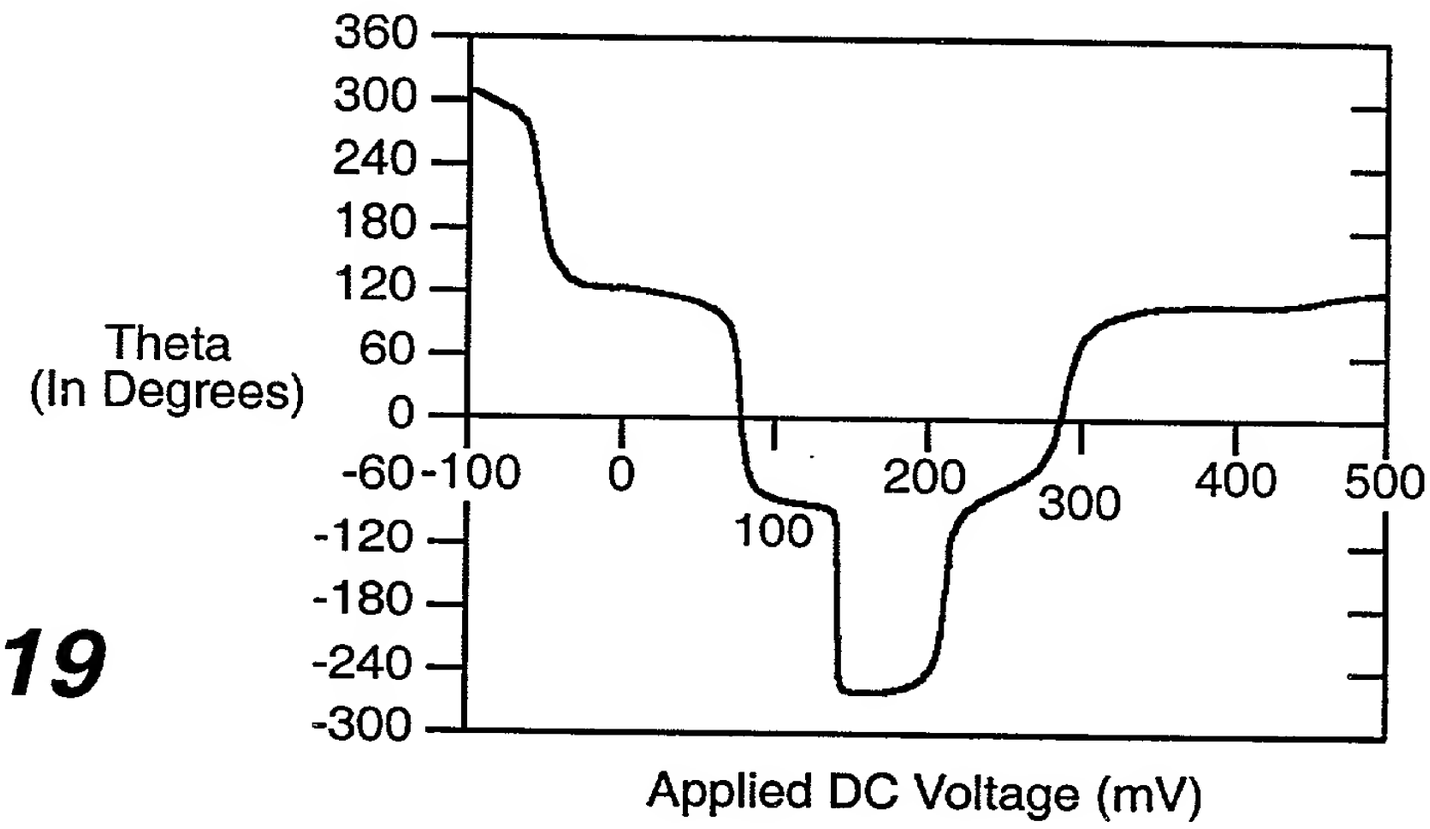


FIG._19

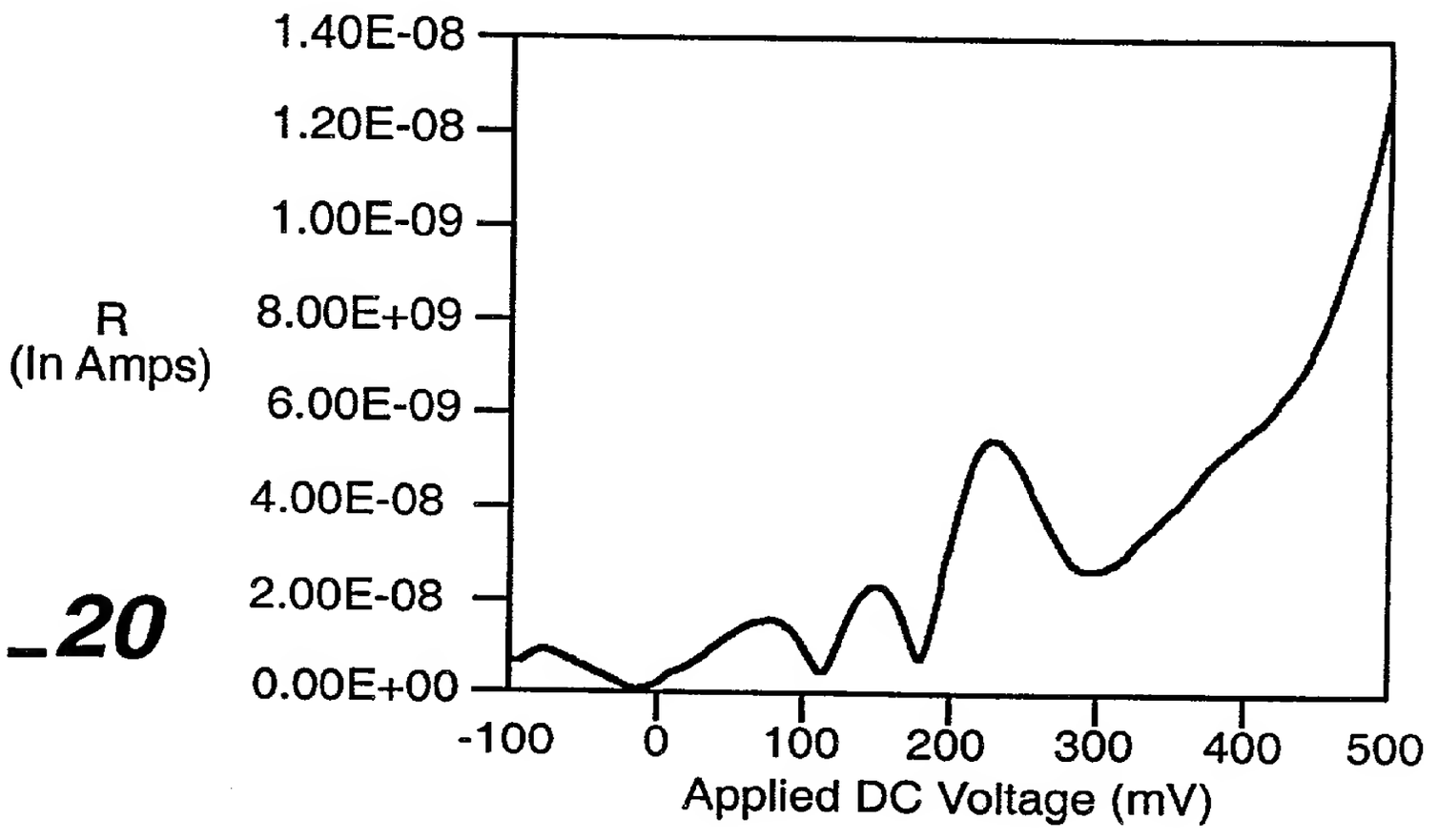


FIG._20

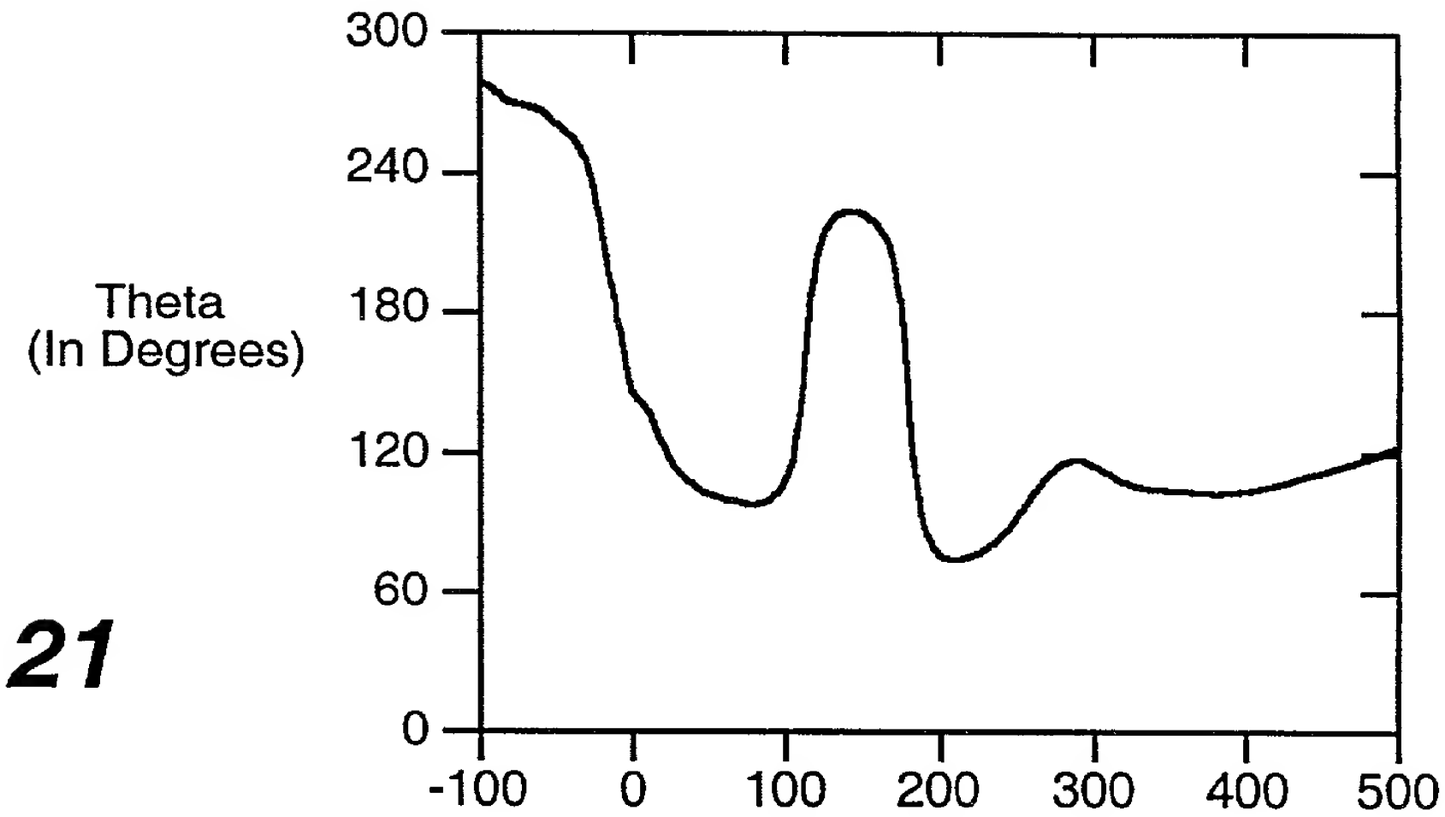


FIG._21

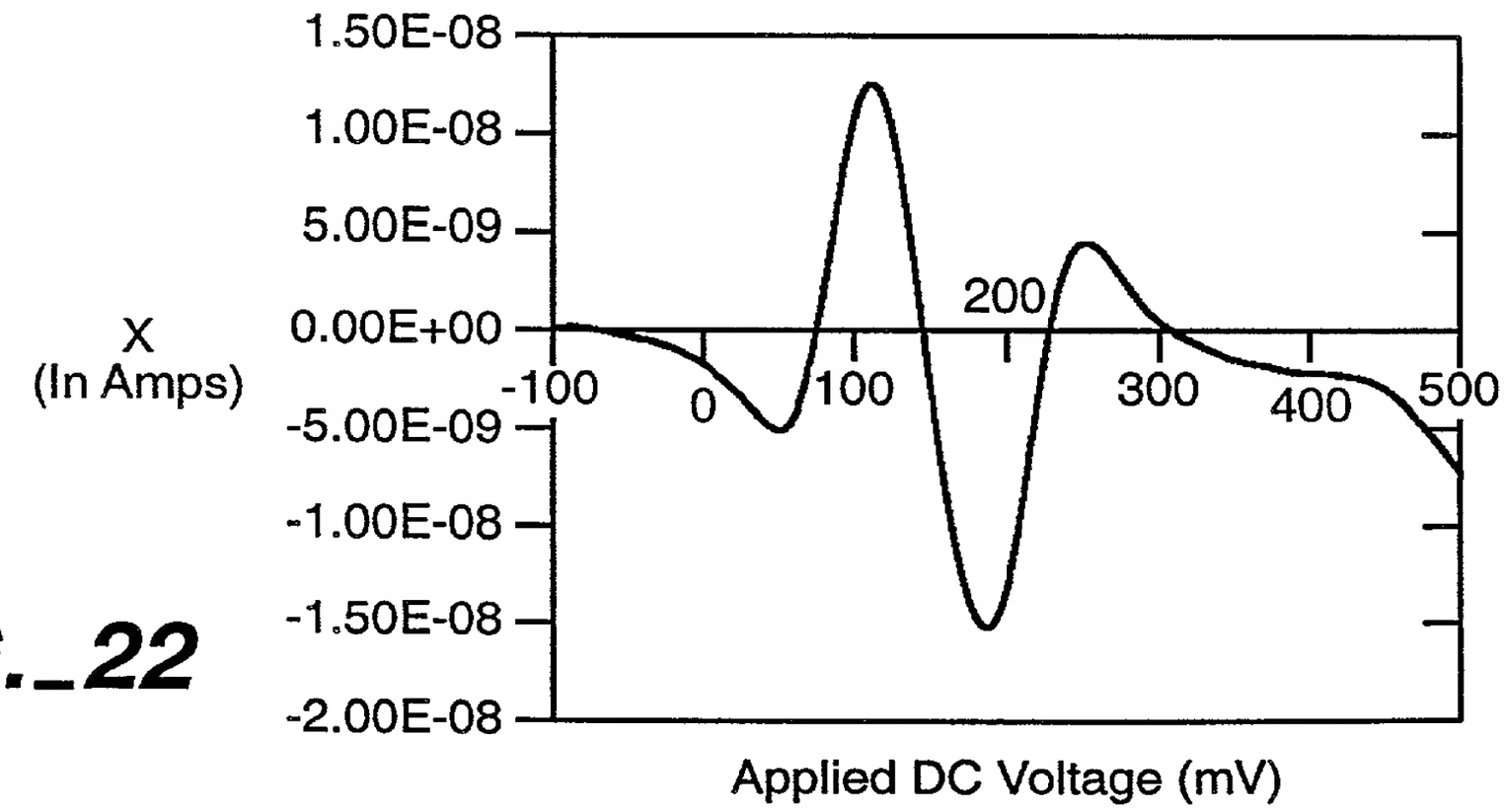


FIG._22

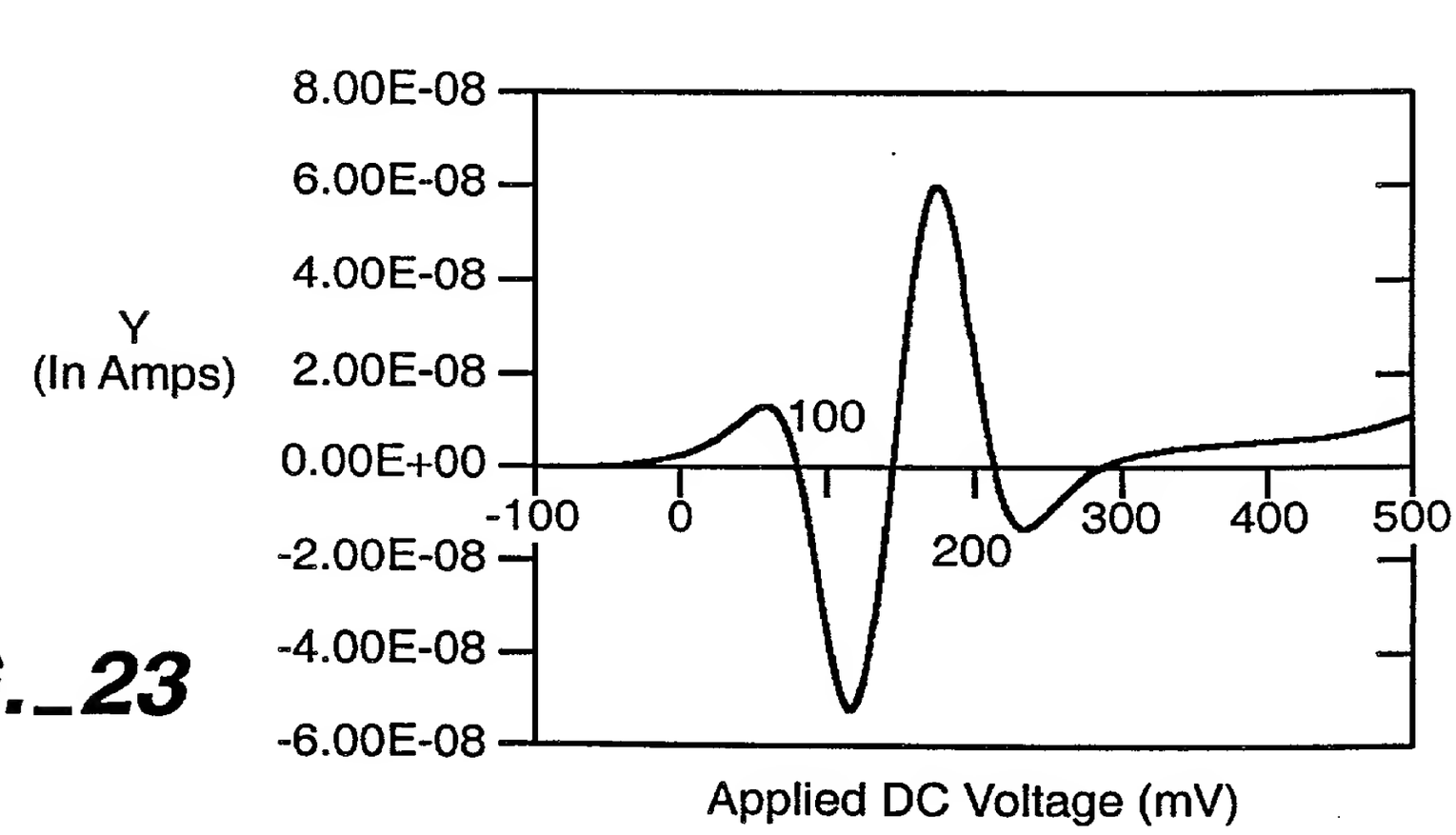


FIG._23

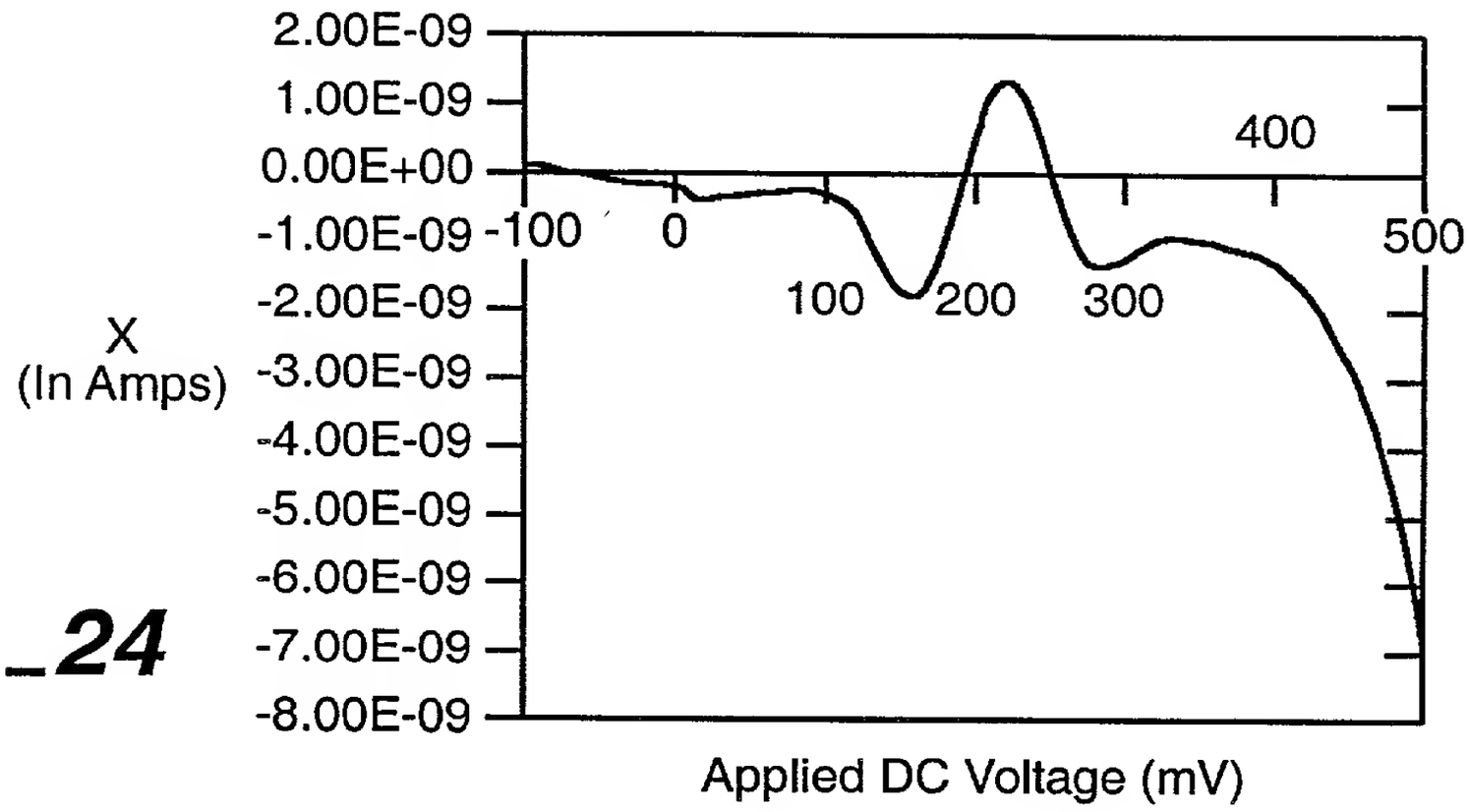

2.00E-09
1.00E-09
0.00E+00
-1.00E-09
-2.00E-09
-3.00E-09
-4.00E-09
-5.00E-09
-6.00E-09
-7.00E-09
-8.00E-09
X
(In Amps)
-100
0
100
200
300
400
500
Applied DC Voltage (mV)

FIG._24

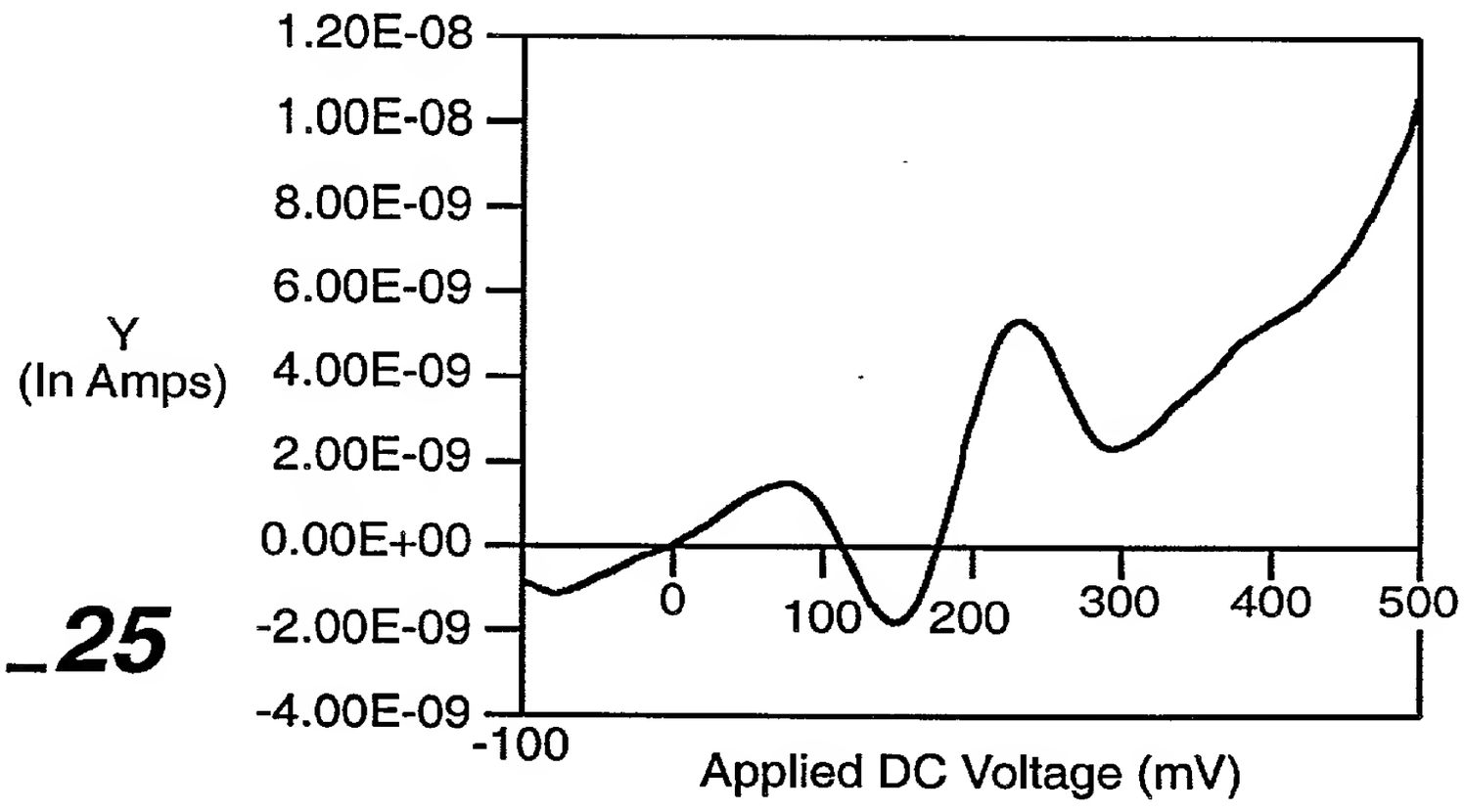

1.20E-08
1.00E-08
8.00E-09
6.00E-09
4.00E-09
2.00E-09
0.00E+00
-2.00E-09
-4.00E-09
Y
(In Amps)
-100
0
100
200
300
400
500
Applied DC Voltage (mV)

FIG._25

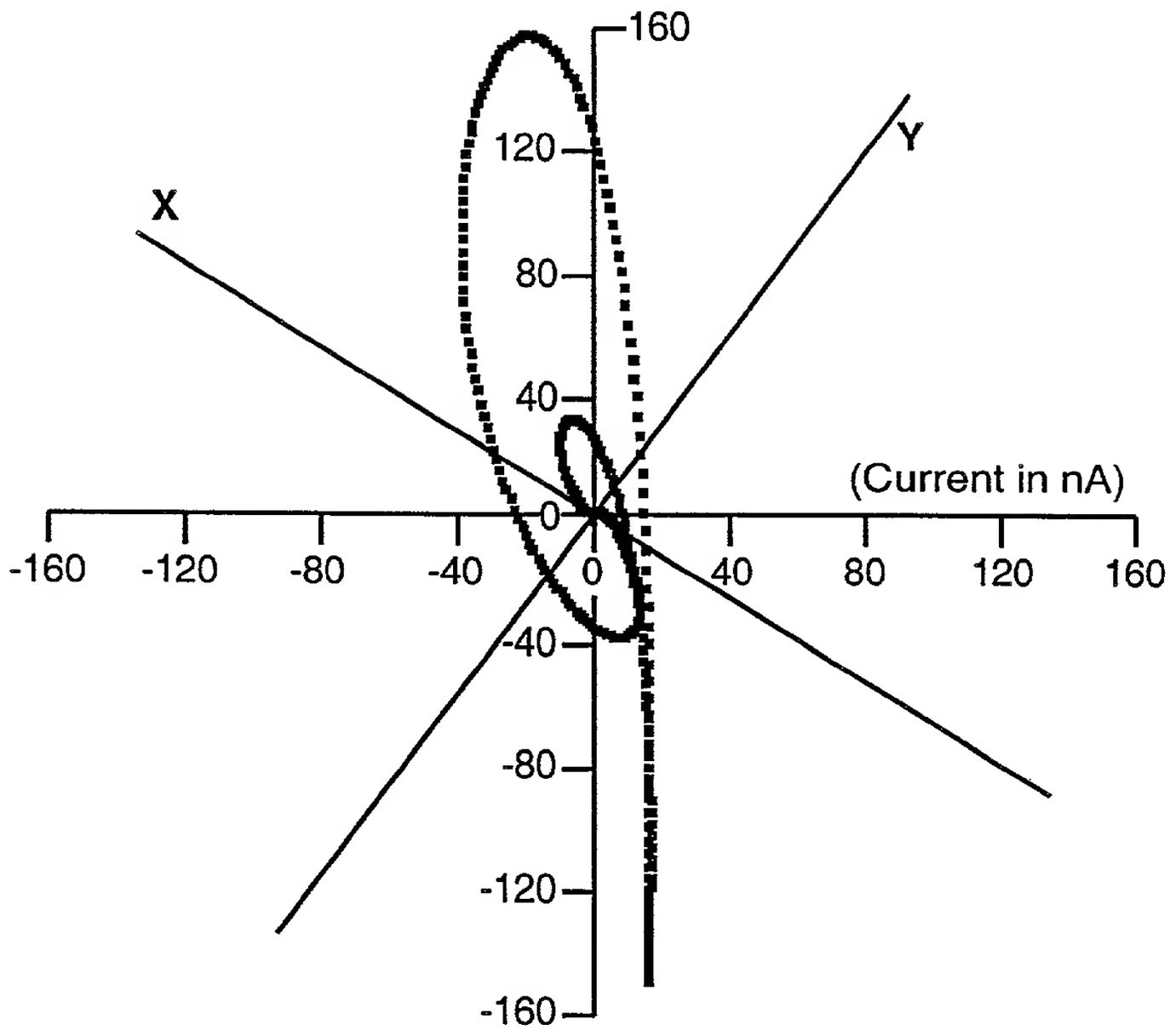

160
120
80
40
0
-40
-80
-120
-160
X
Y
(Current in nA)
-160
-120
-80
-40
0
40
80
120
160

FIG._26

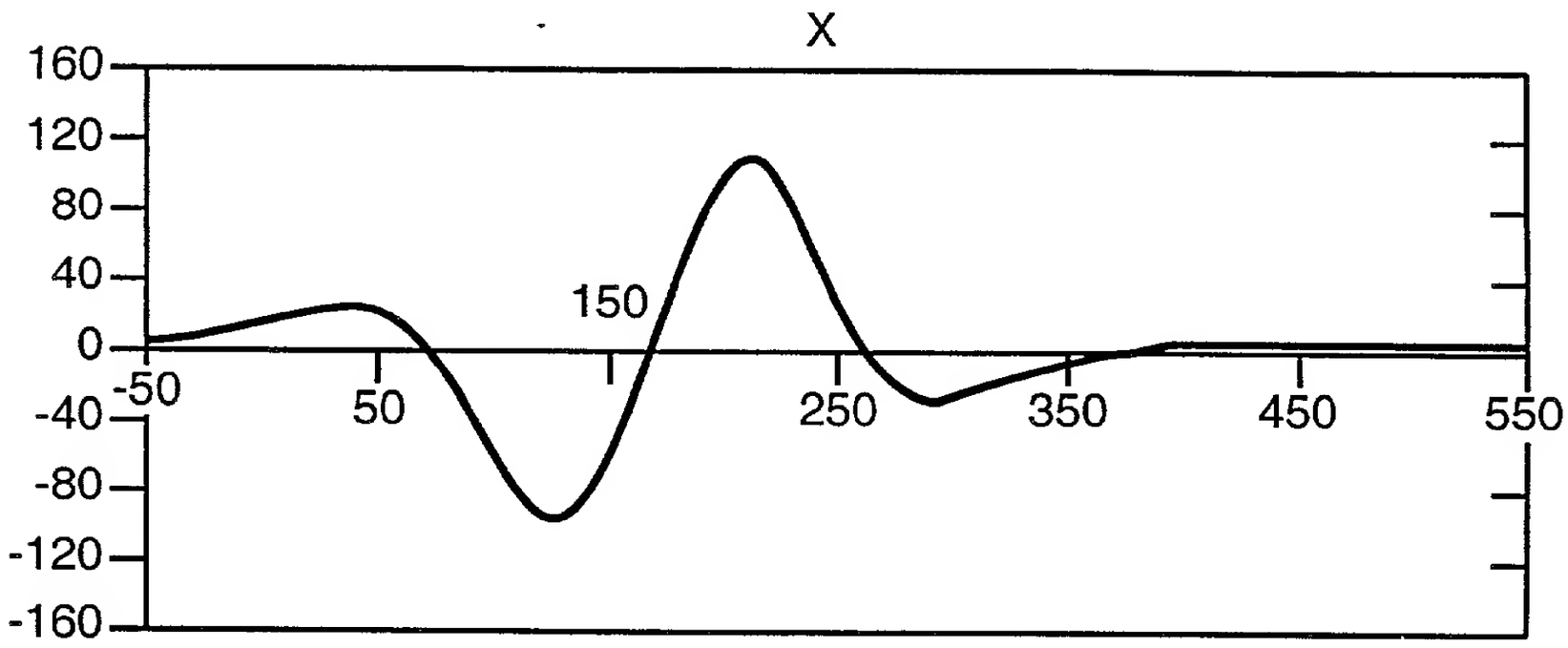


FIG._27

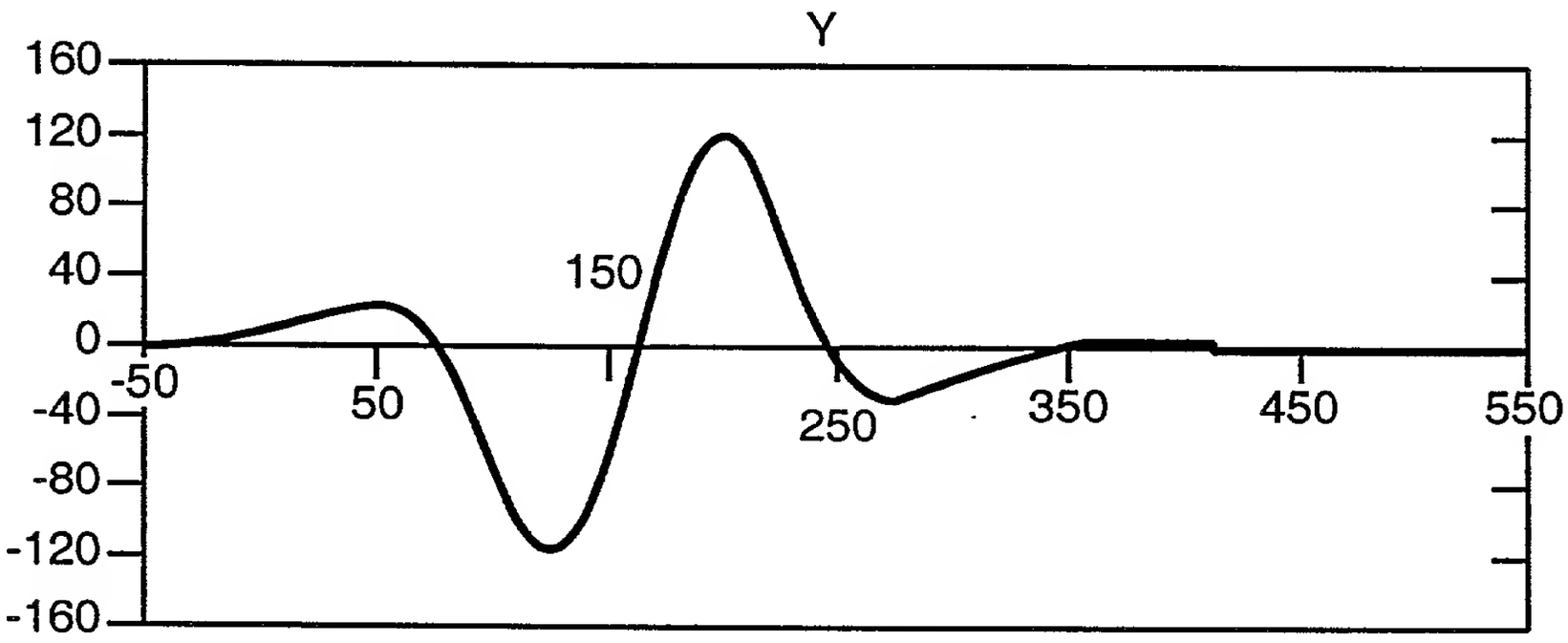


FIG._28

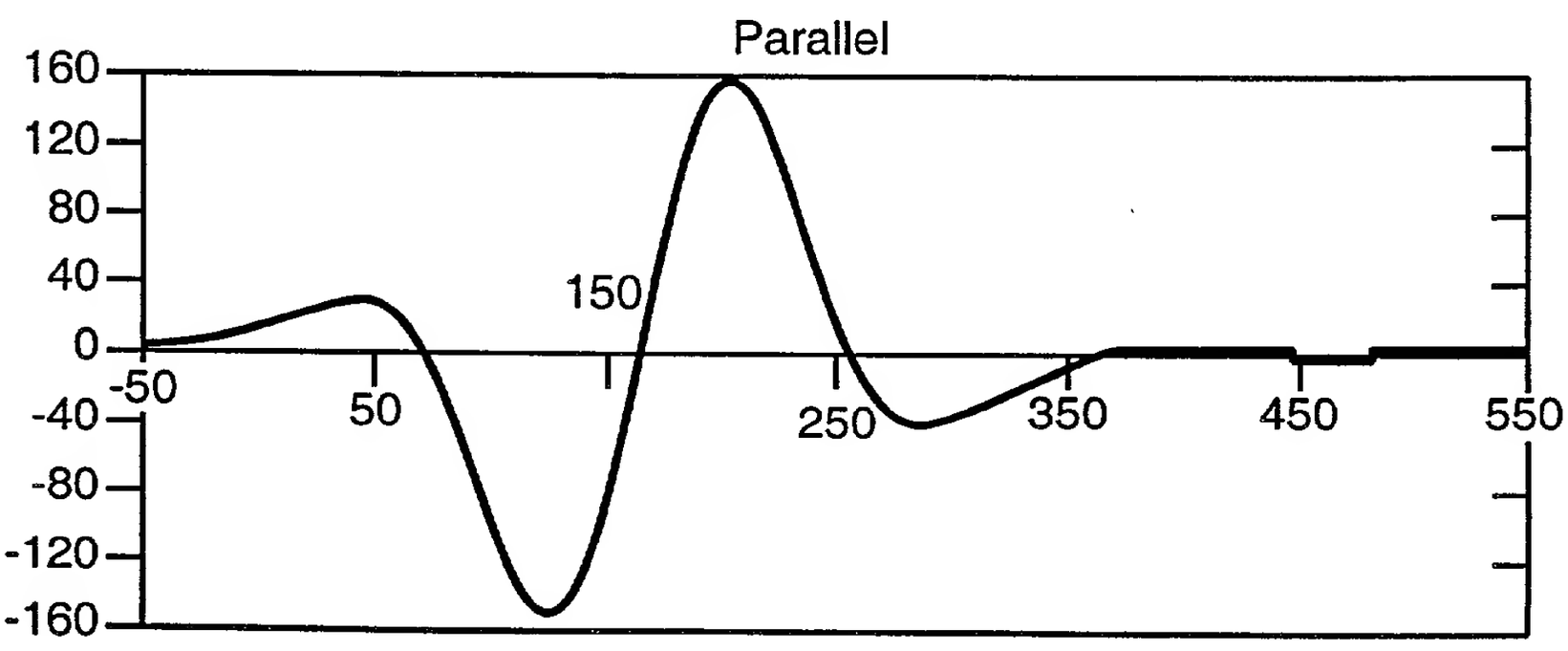


FIG._29

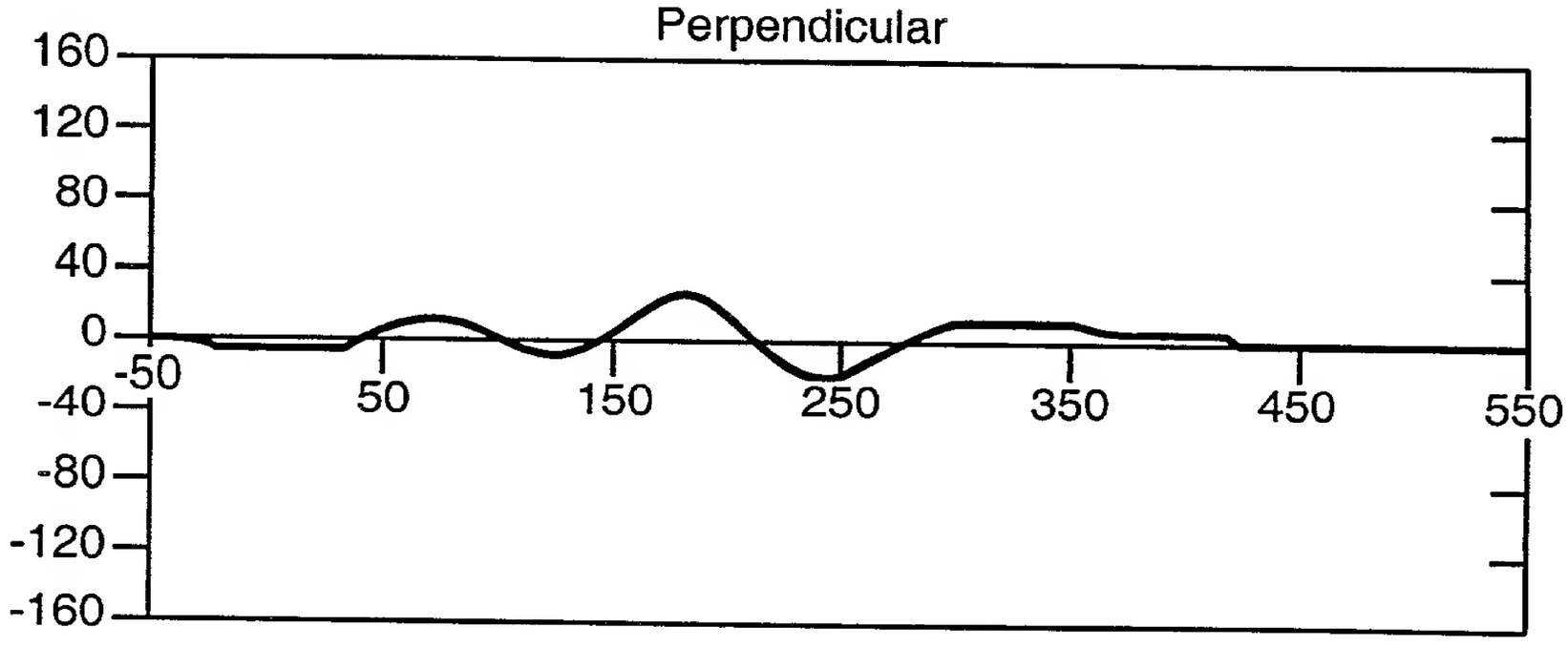


FIG._30

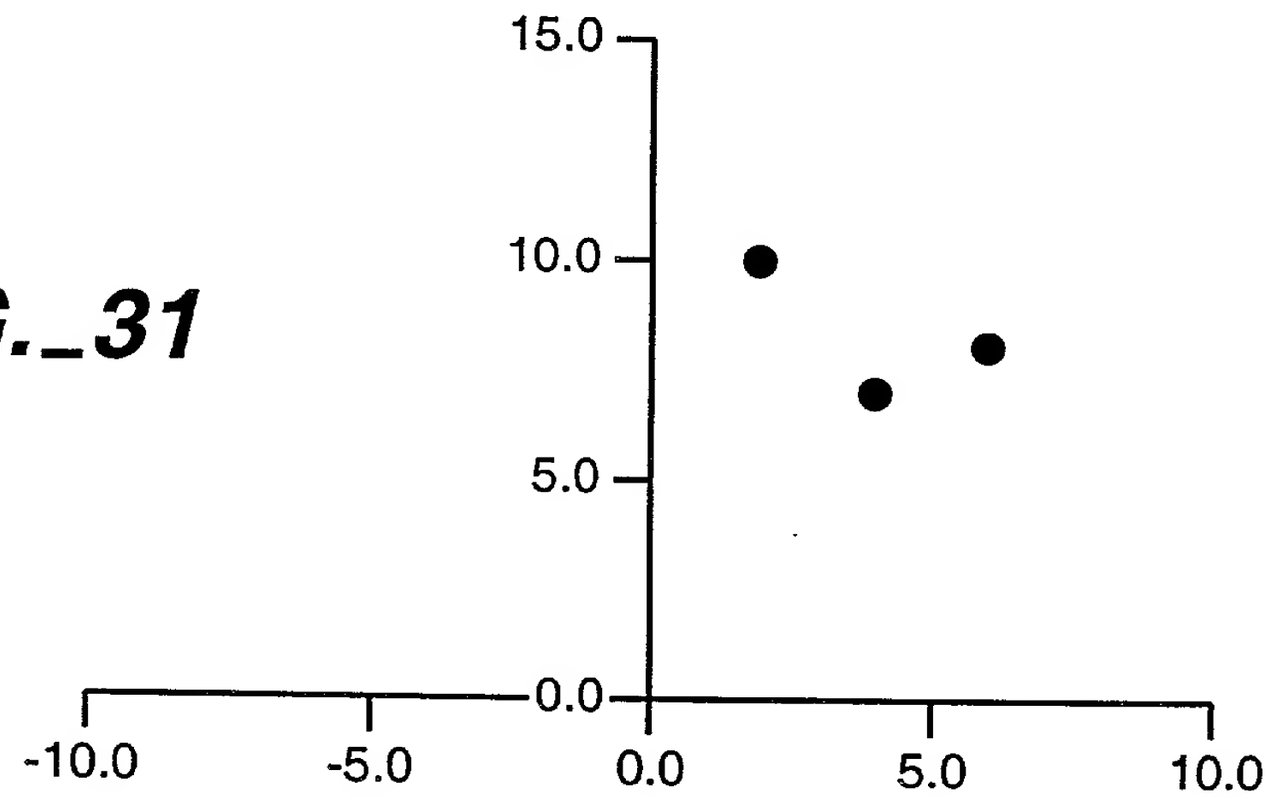


FIG._31

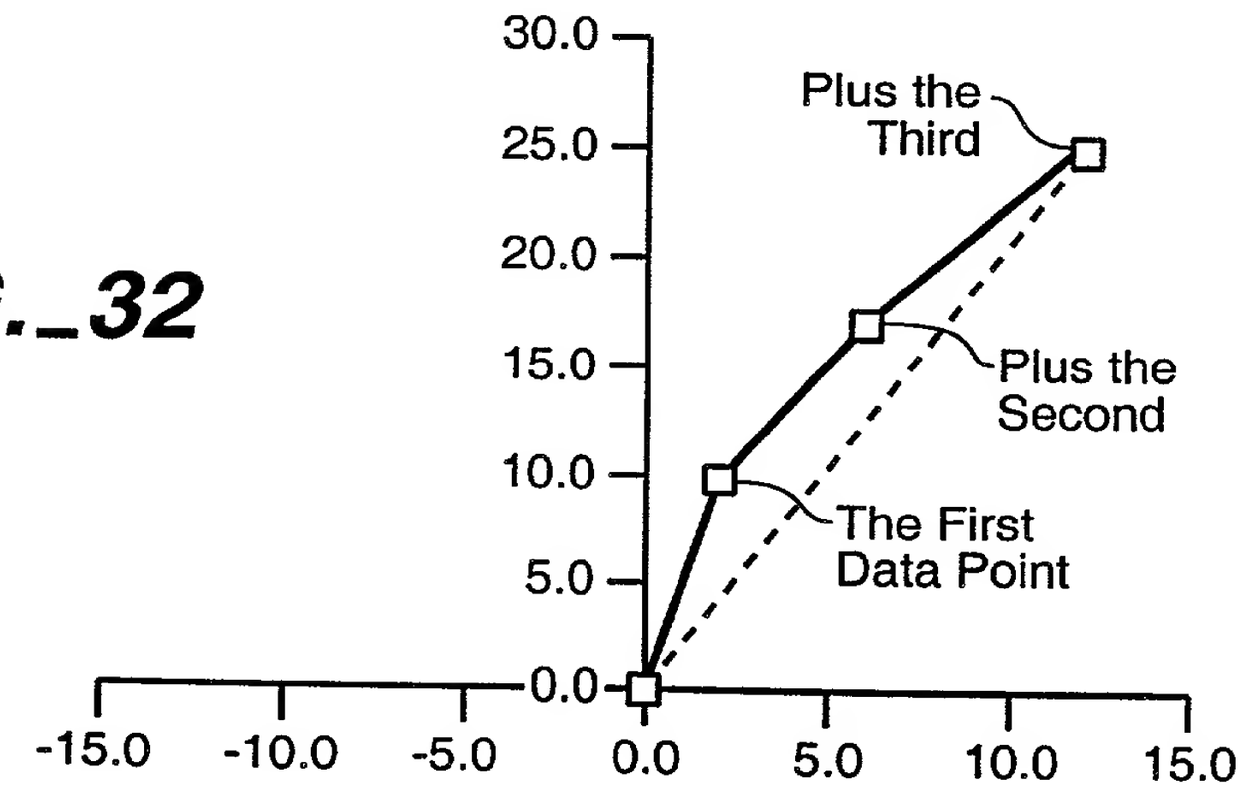


FIG._32

FIG._33

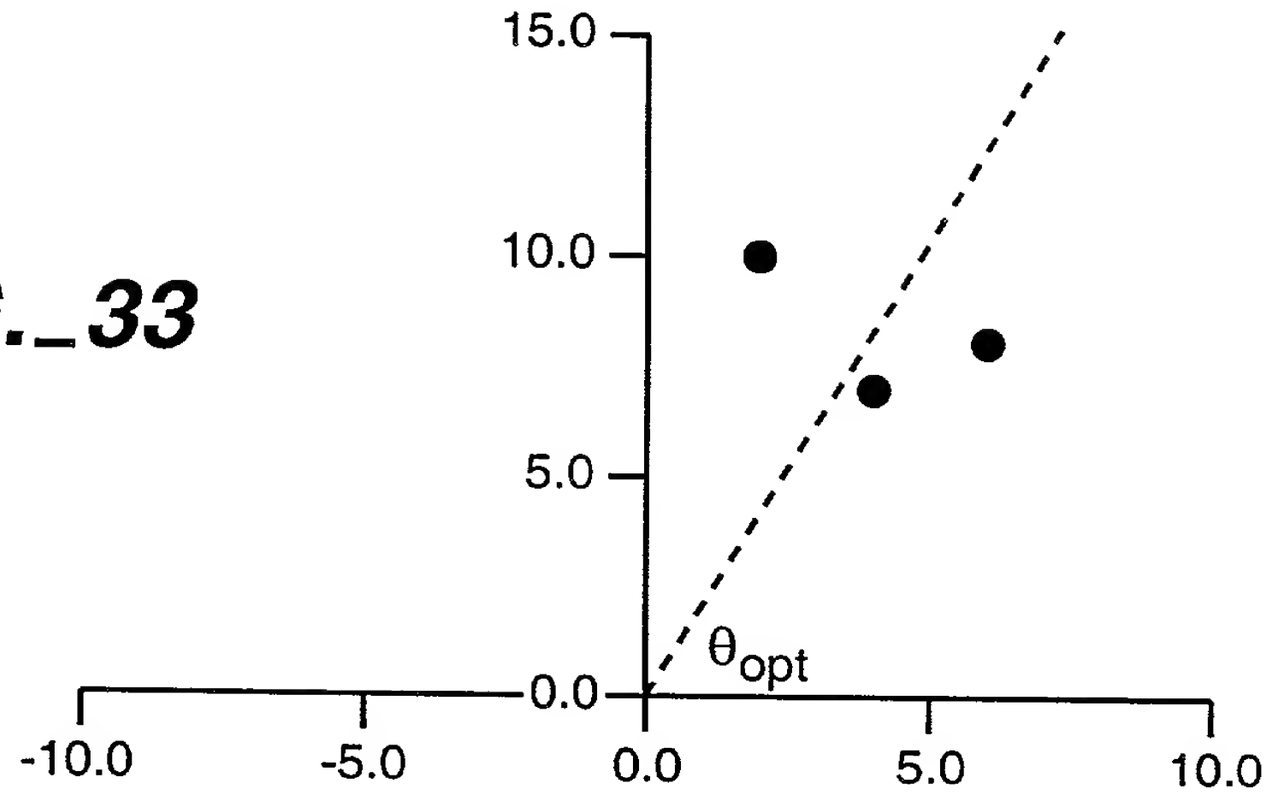


FIG._34

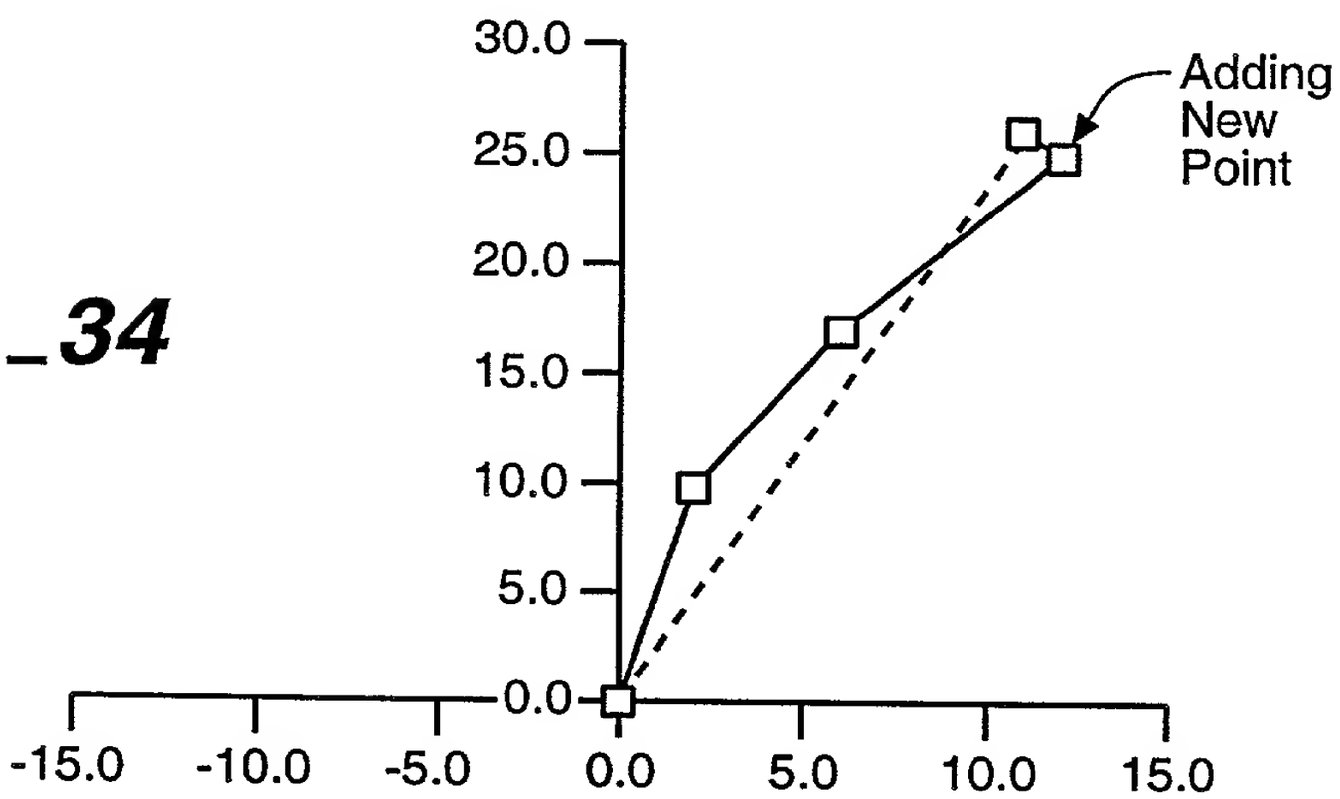
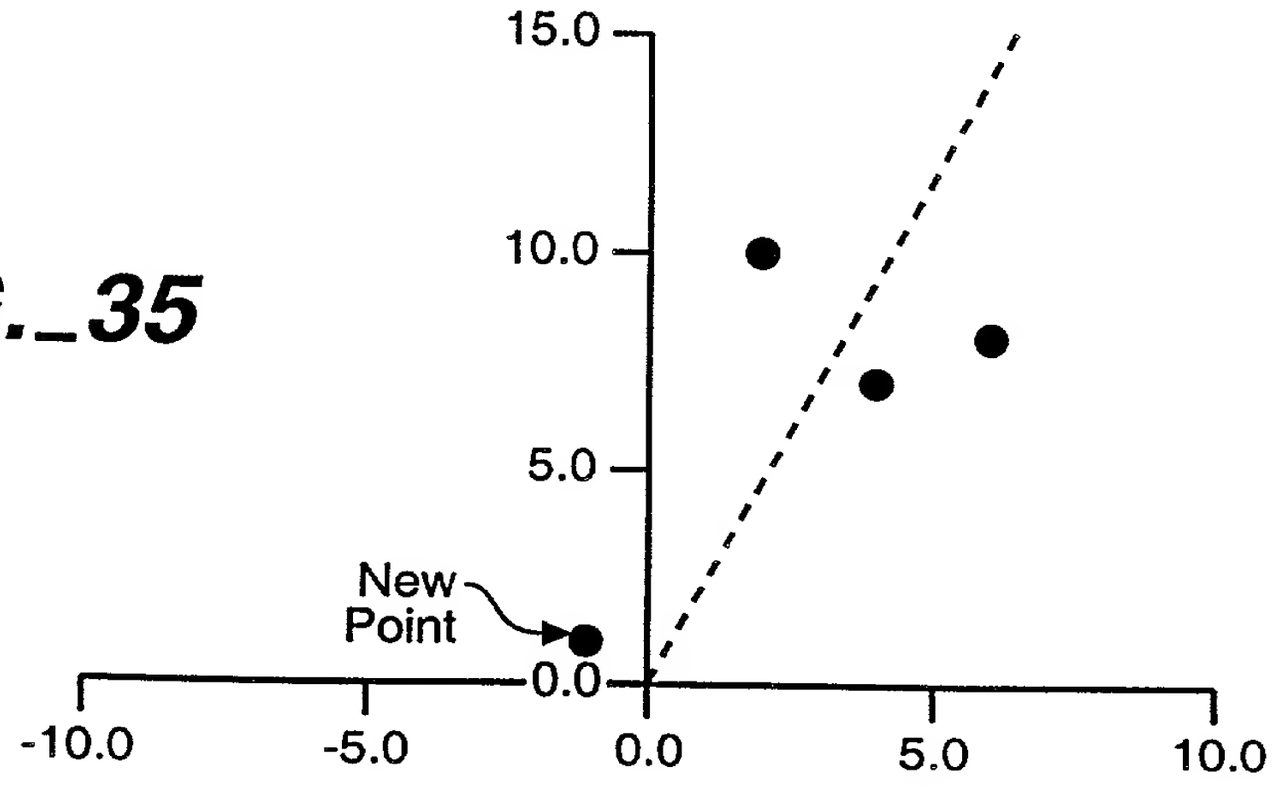


FIG._35



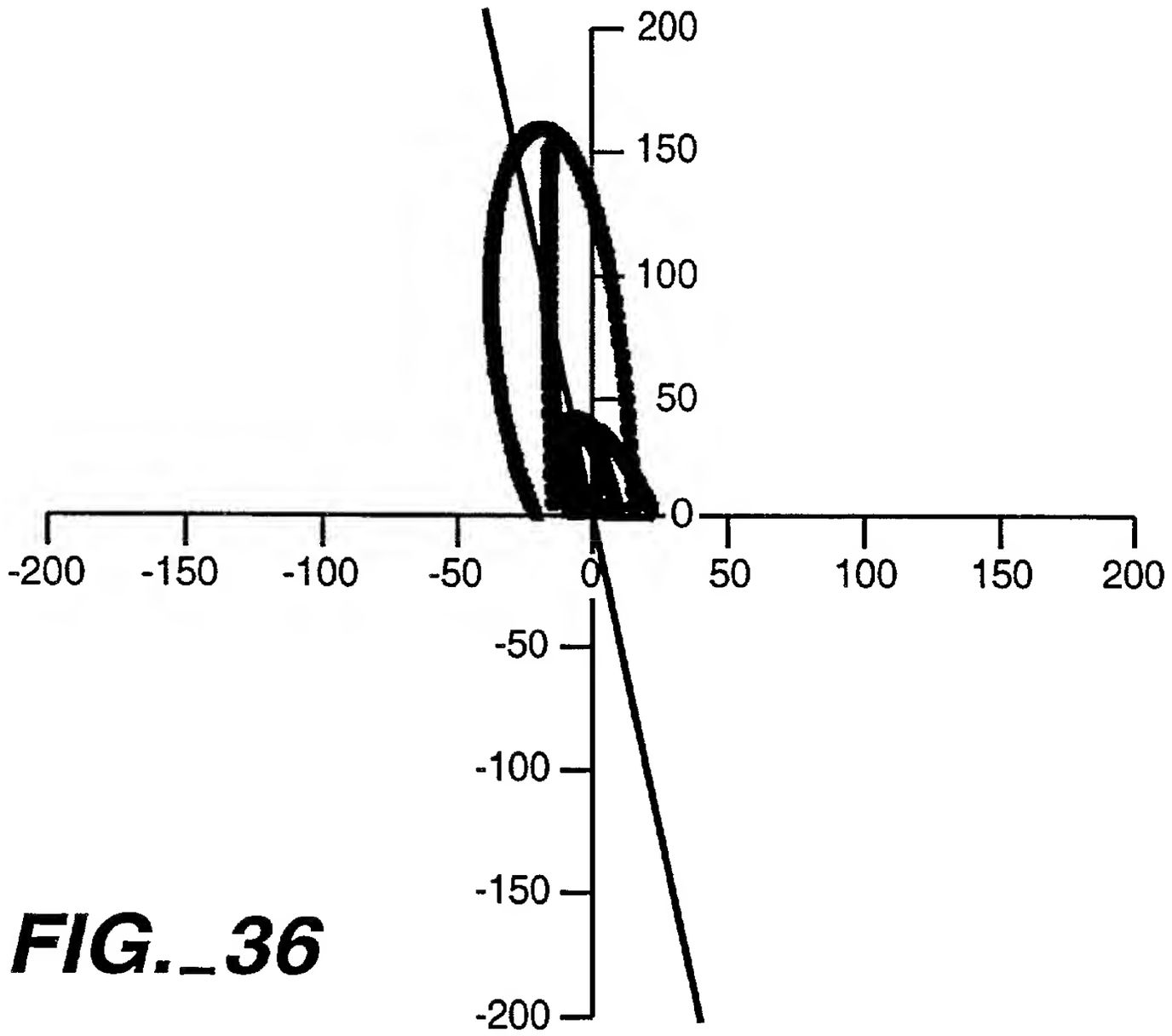

200
150
100
50
0
-50
-100
-150
-200
-200
-150
-100
-50
0
50
100
150
200

FIG._36

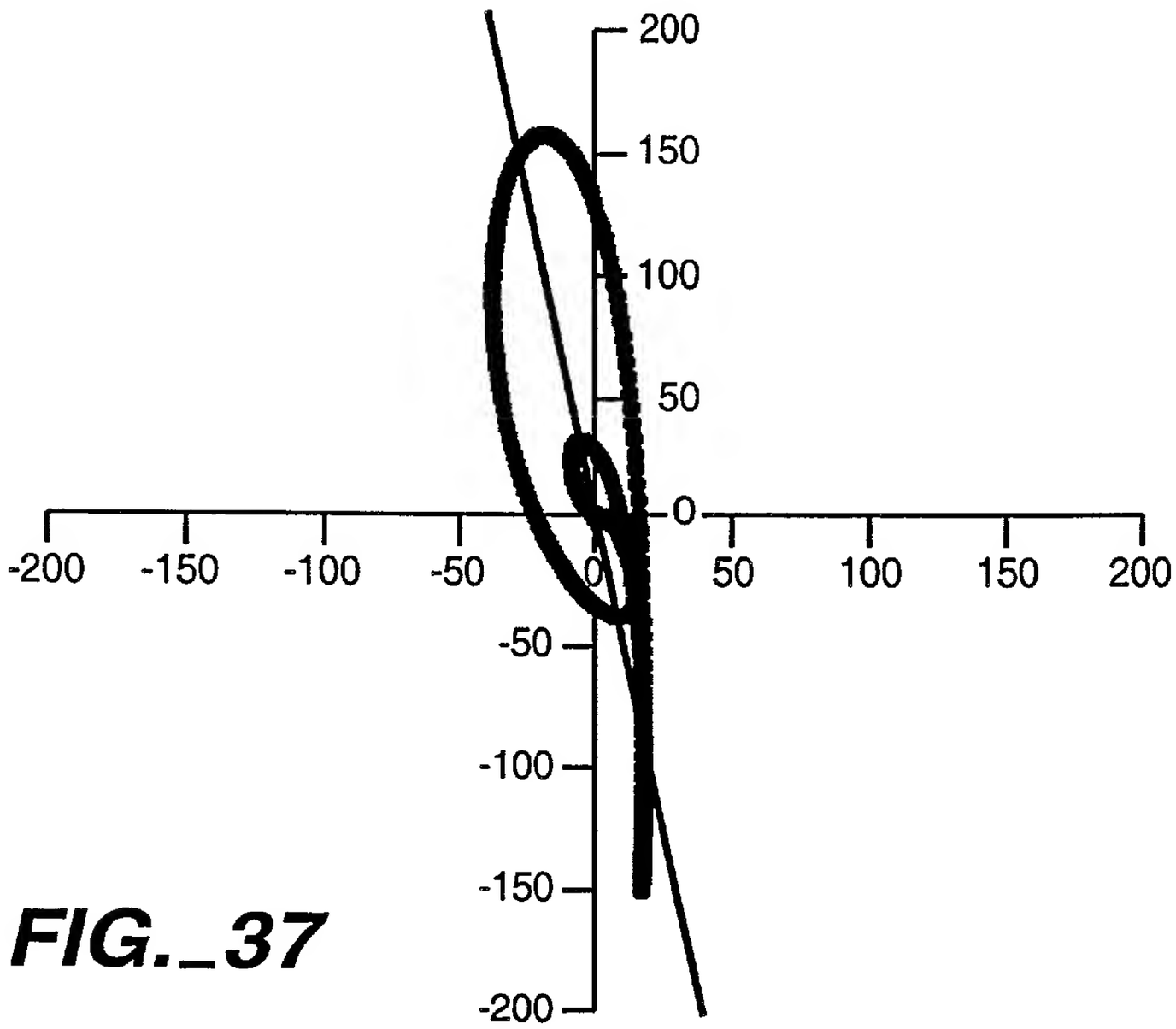

200
150
100
50
0
-50
-100
-150
-200
-200
-150
-100
-50
0
50
100
150
200

FIG._37

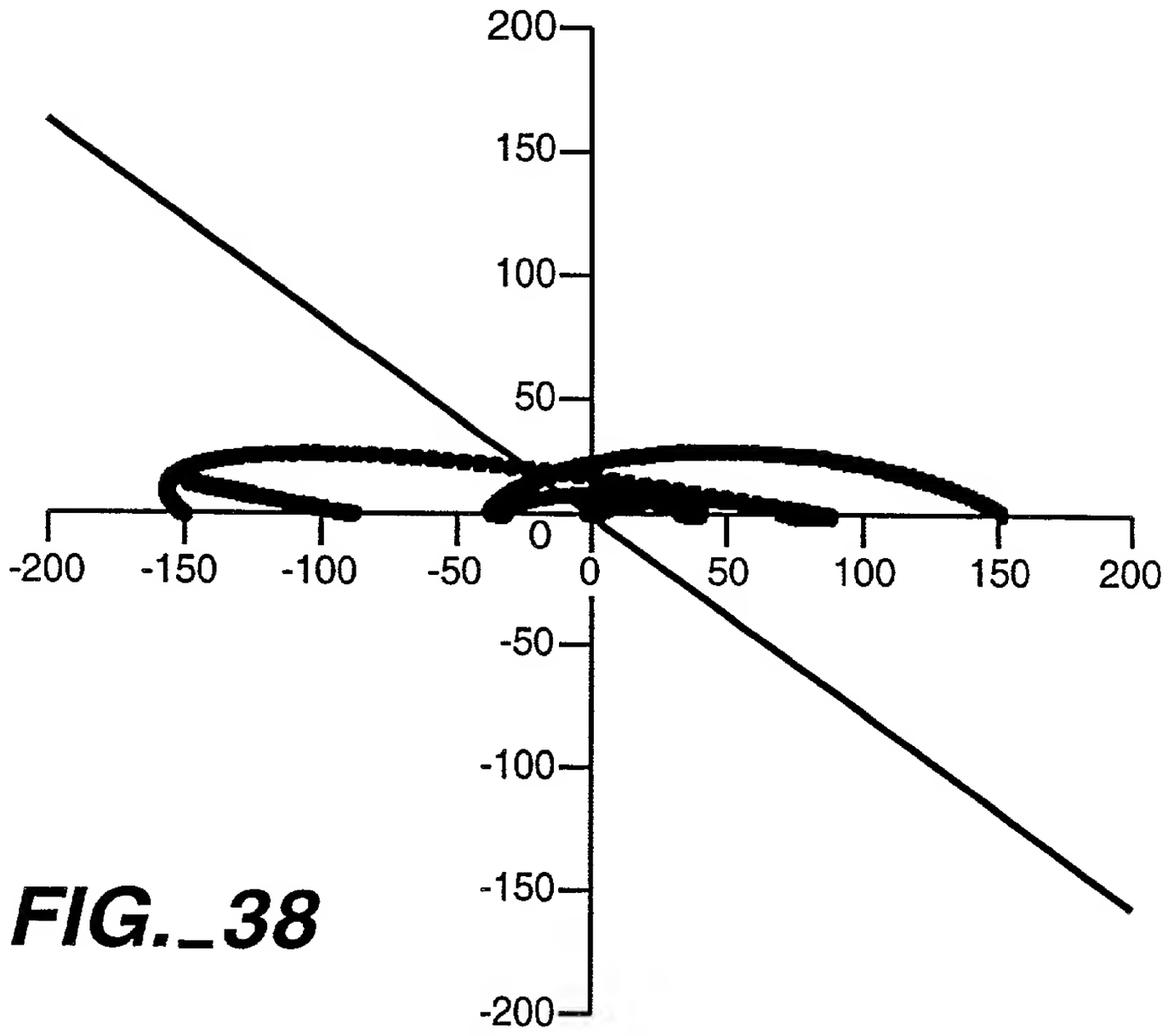

200
150
100
50
0
-50
-100
-150
-200
-200
-150
-100
-50
0
50
100
150
200

FIG._38

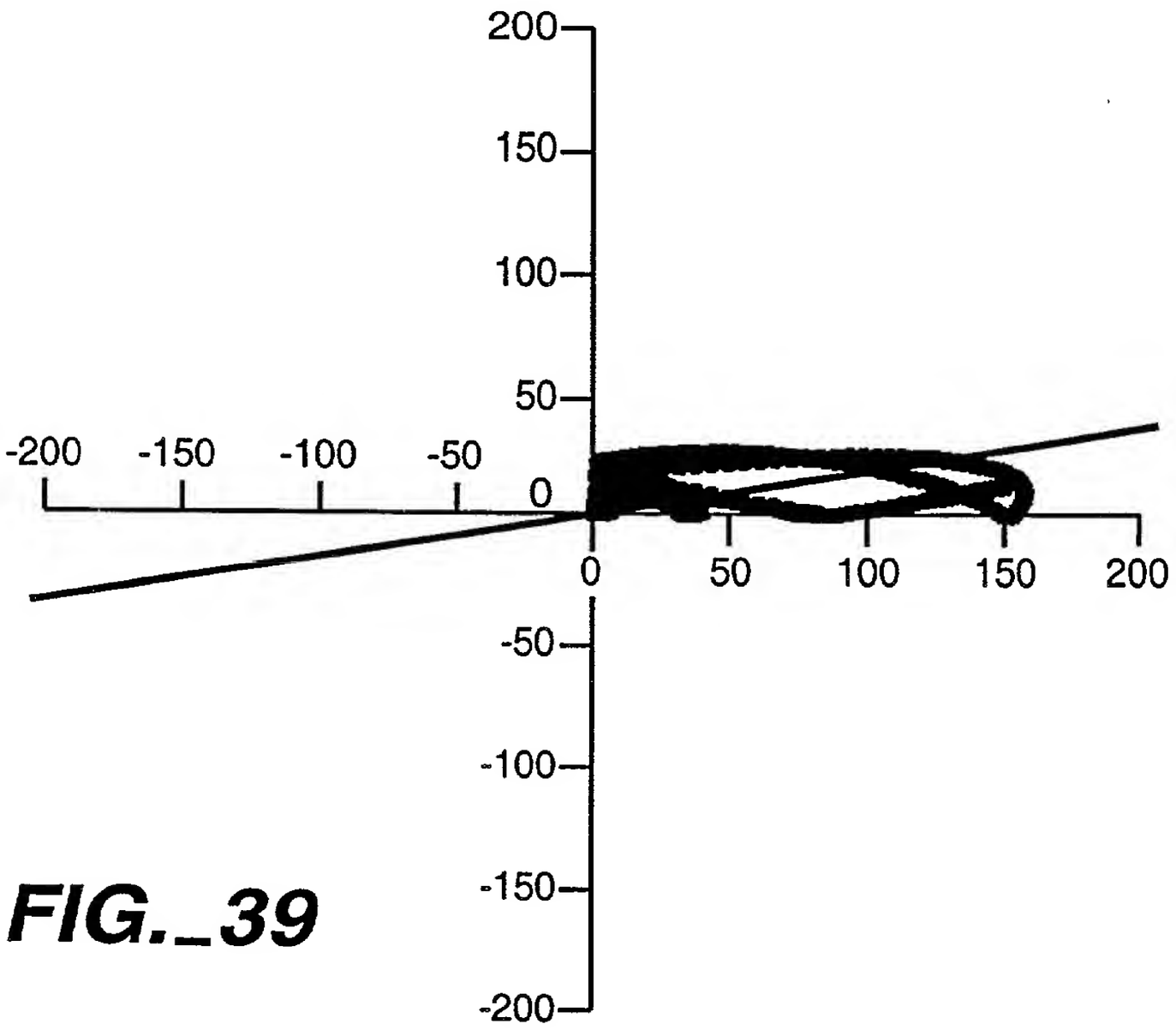

200
150
100
50
0
-50
-100
-150
-200
-200
-150
-100
-50
0
50
100
150
200

FIG._39

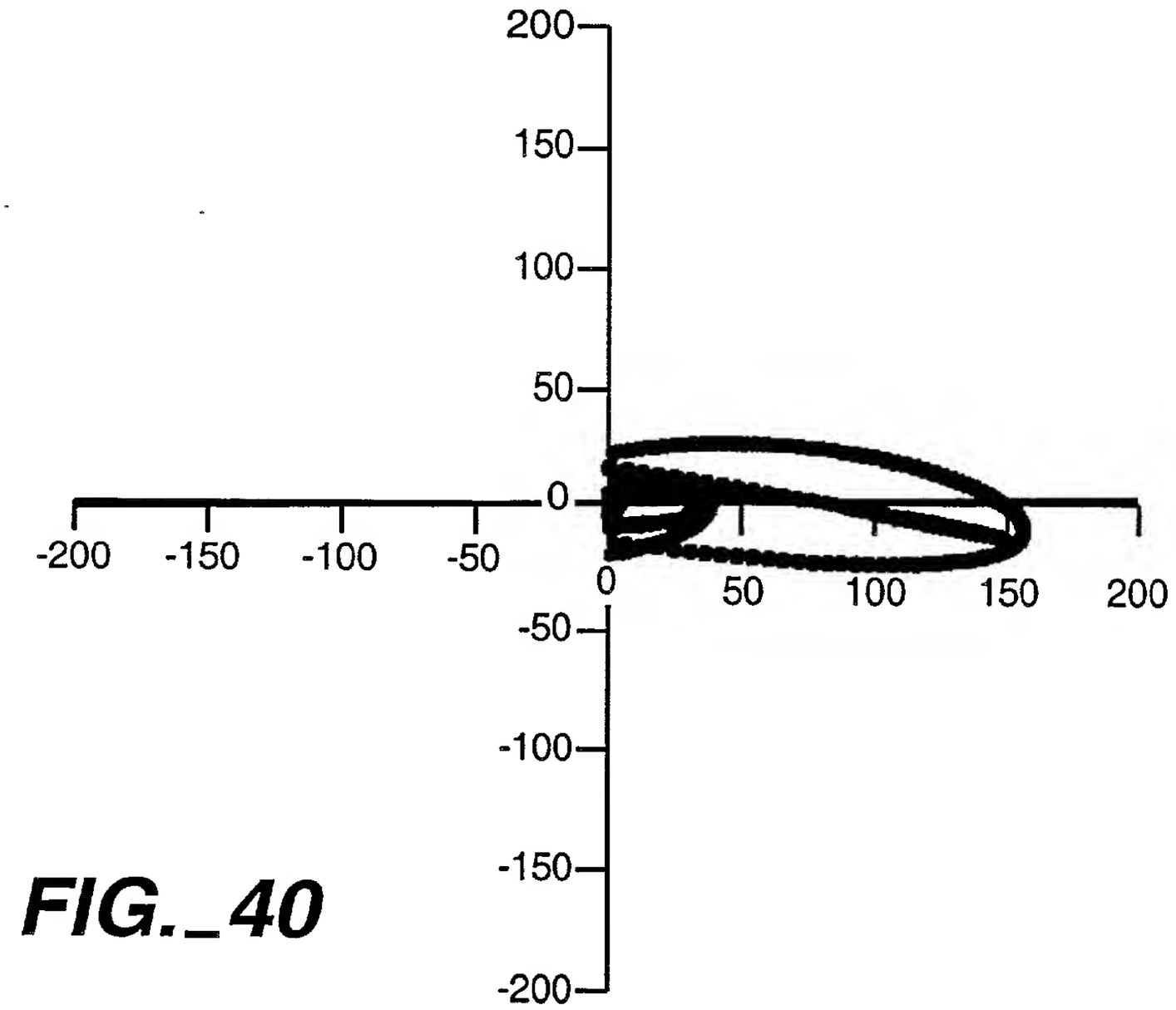

200
150
100
50
0
-50
-100
-150
-200
-200
-150
-100
-50
0
50
100
150
200

FIG._40

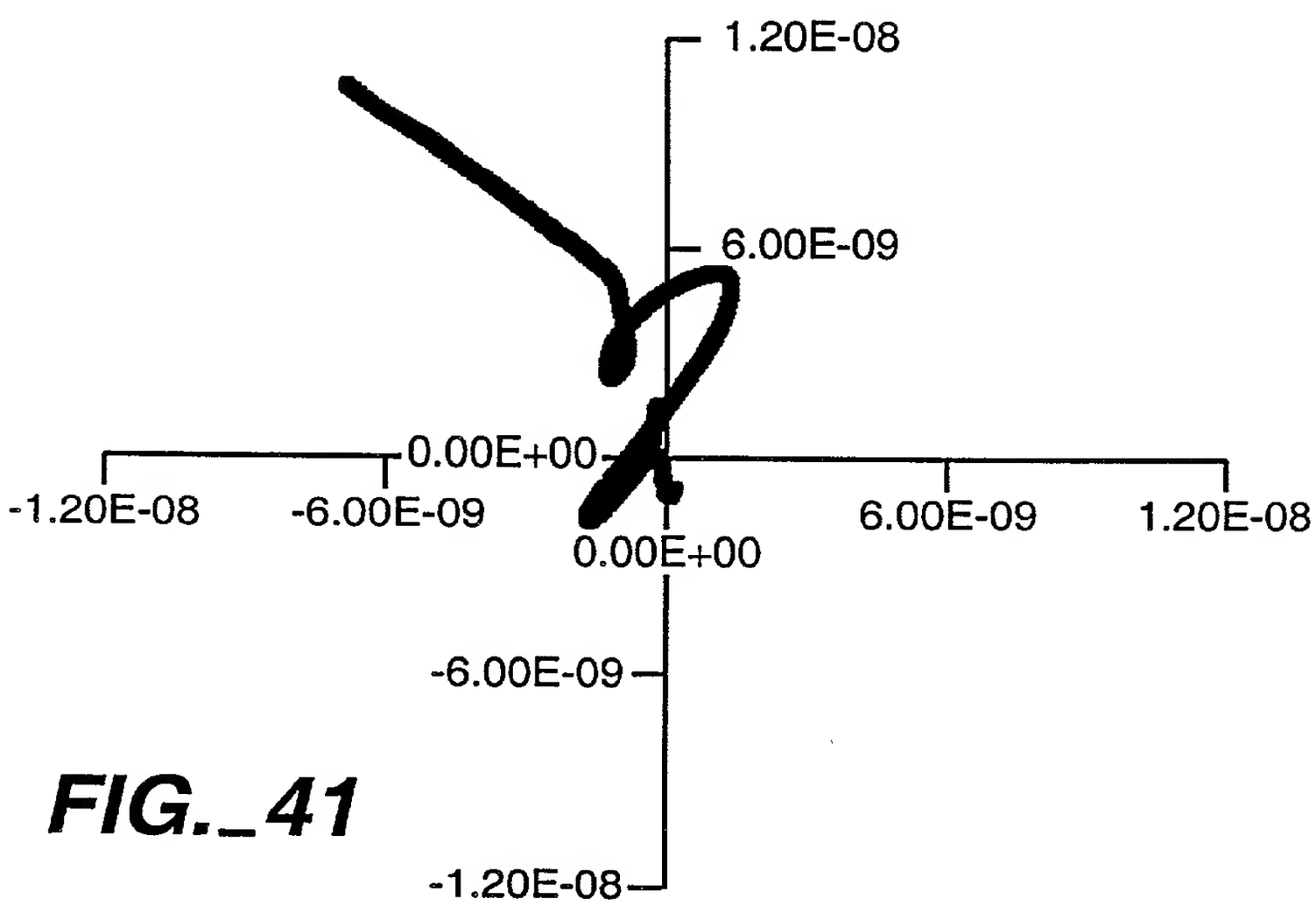

1.20E-08
6.00E-09
0.00E+00
-6.00E-09
-1.20E-08
-1.20E-08
-6.00E-09
0.00E+00
6.00E-09
1.20E-08

FIG._41

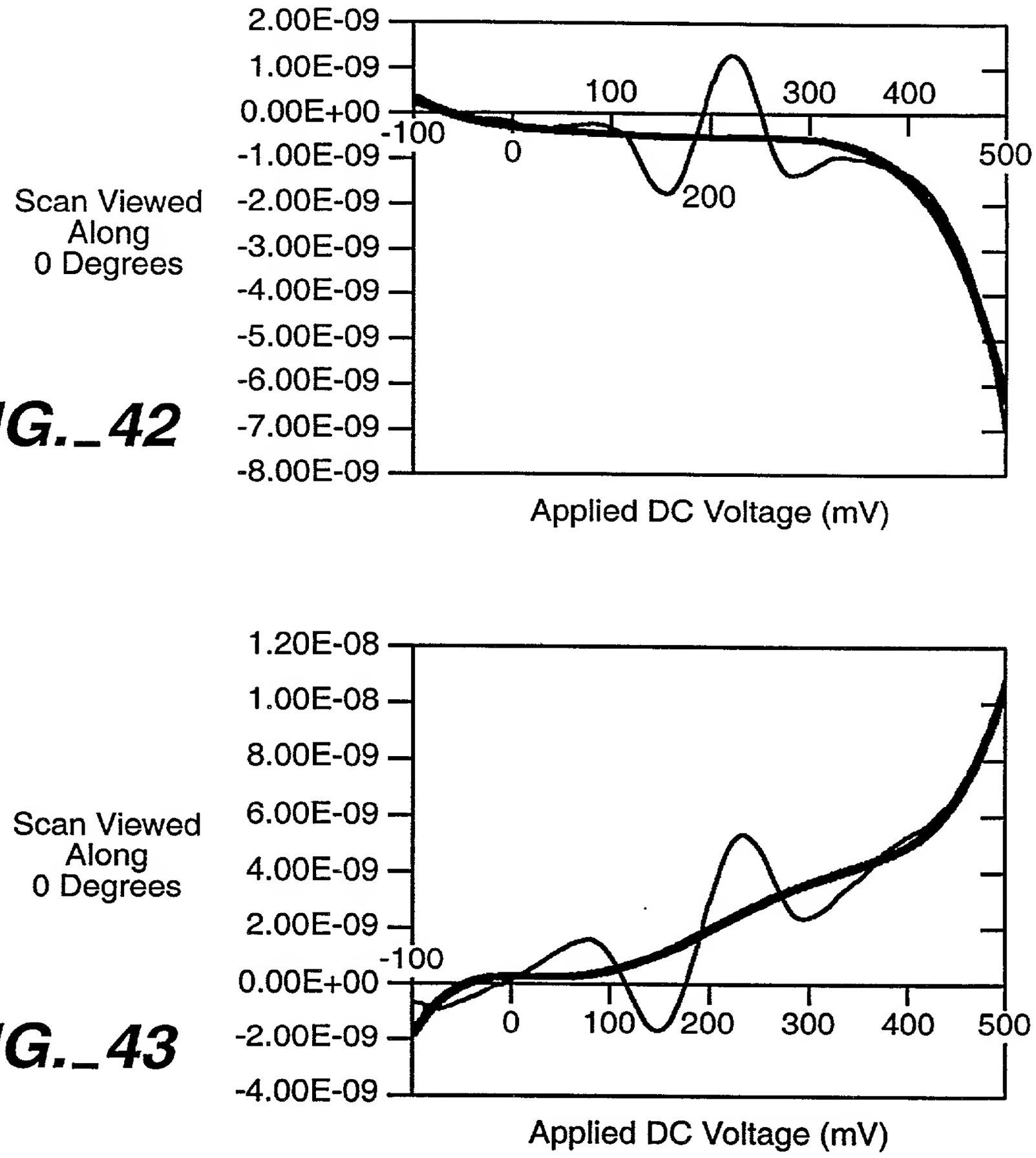


FIG._42

FIG._43

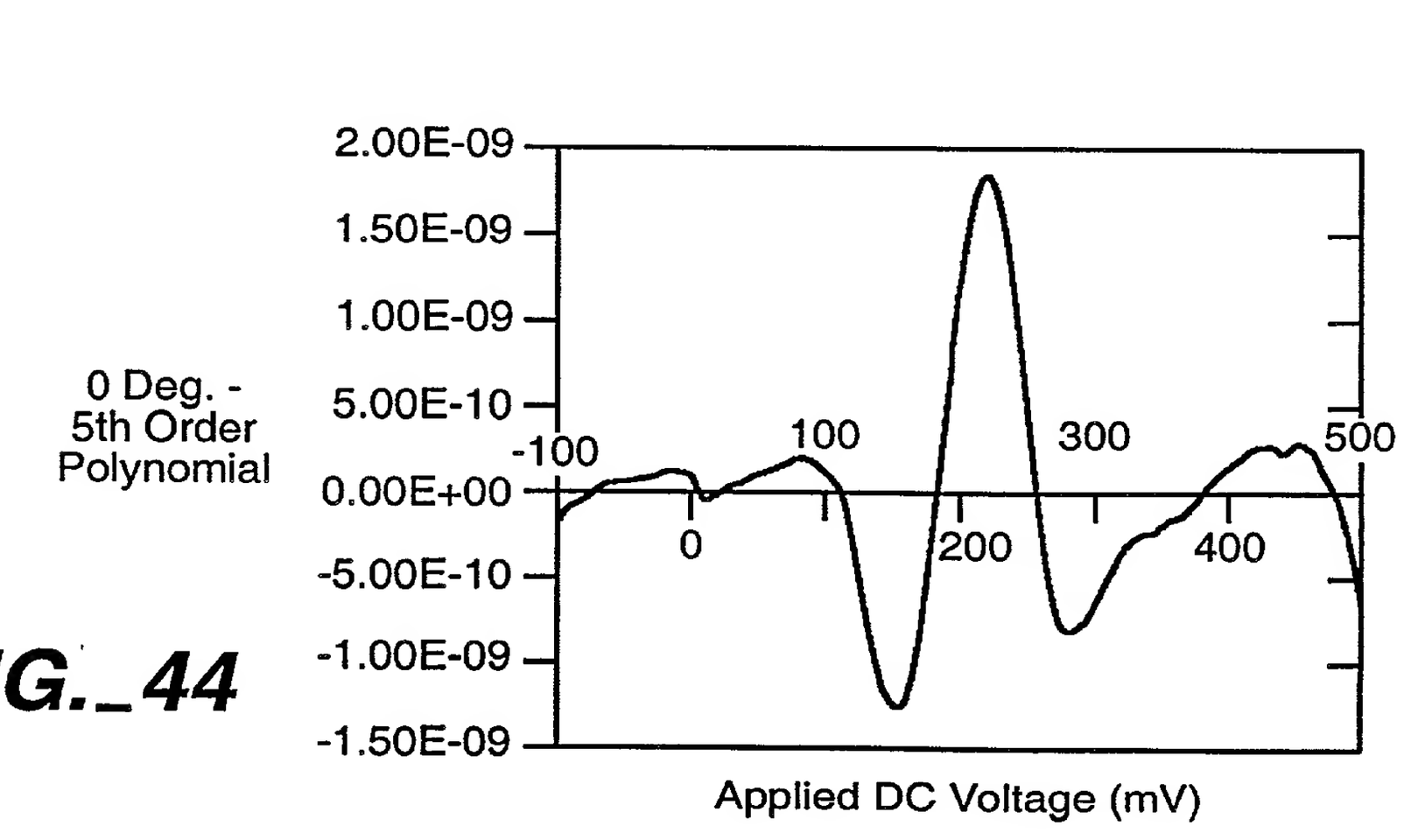


FIG._44

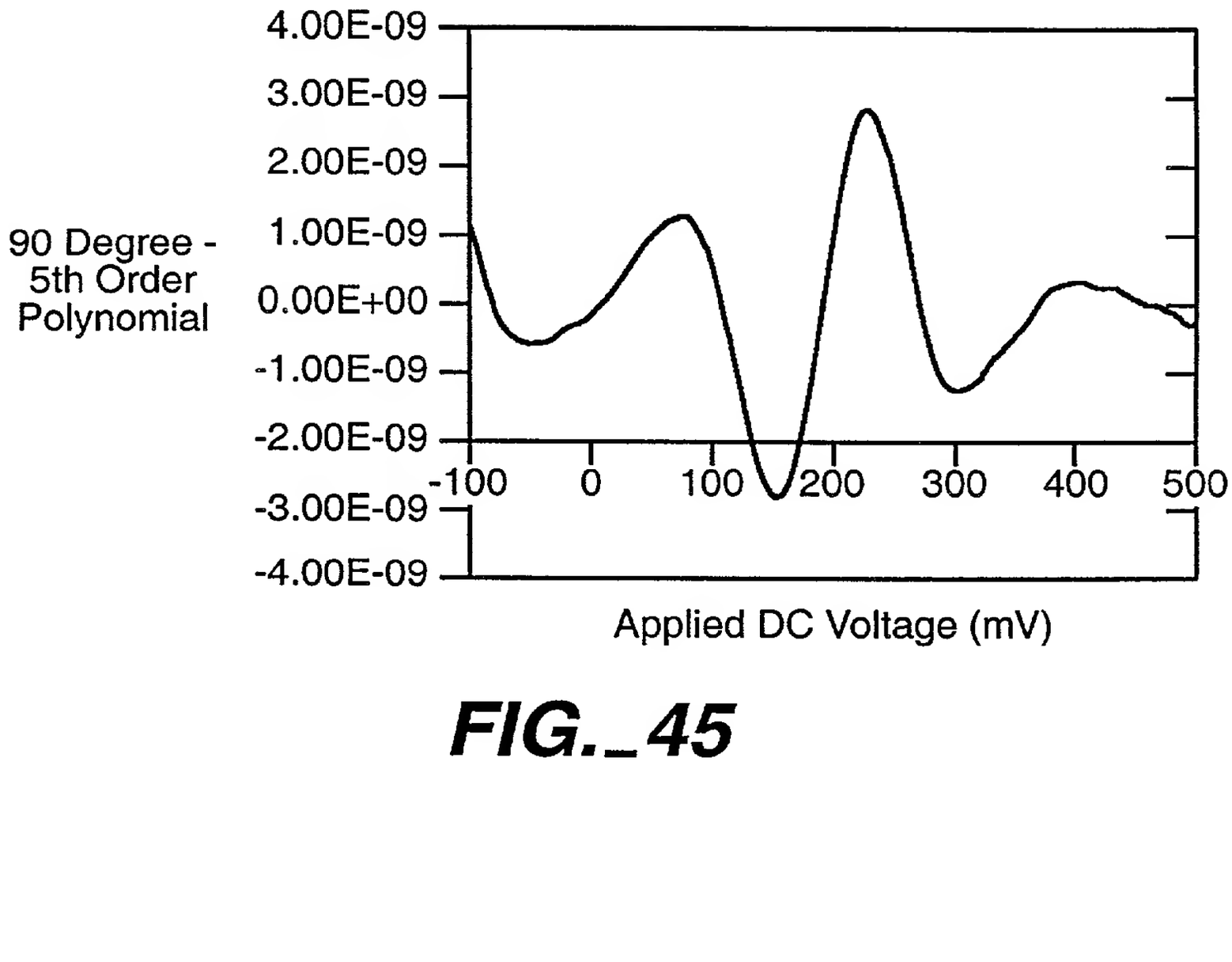

4.00E-09
3.00E-09
2.00E-09
1.00E-09
0.00E+00
-1.00E-09
-2.00E-09
-3.00E-09
-4.00E-09
90 Degree -
5th Order
Polynomial
-100
0
100
200
300
400
500
Applied DC Voltage (mV)

FIG._45

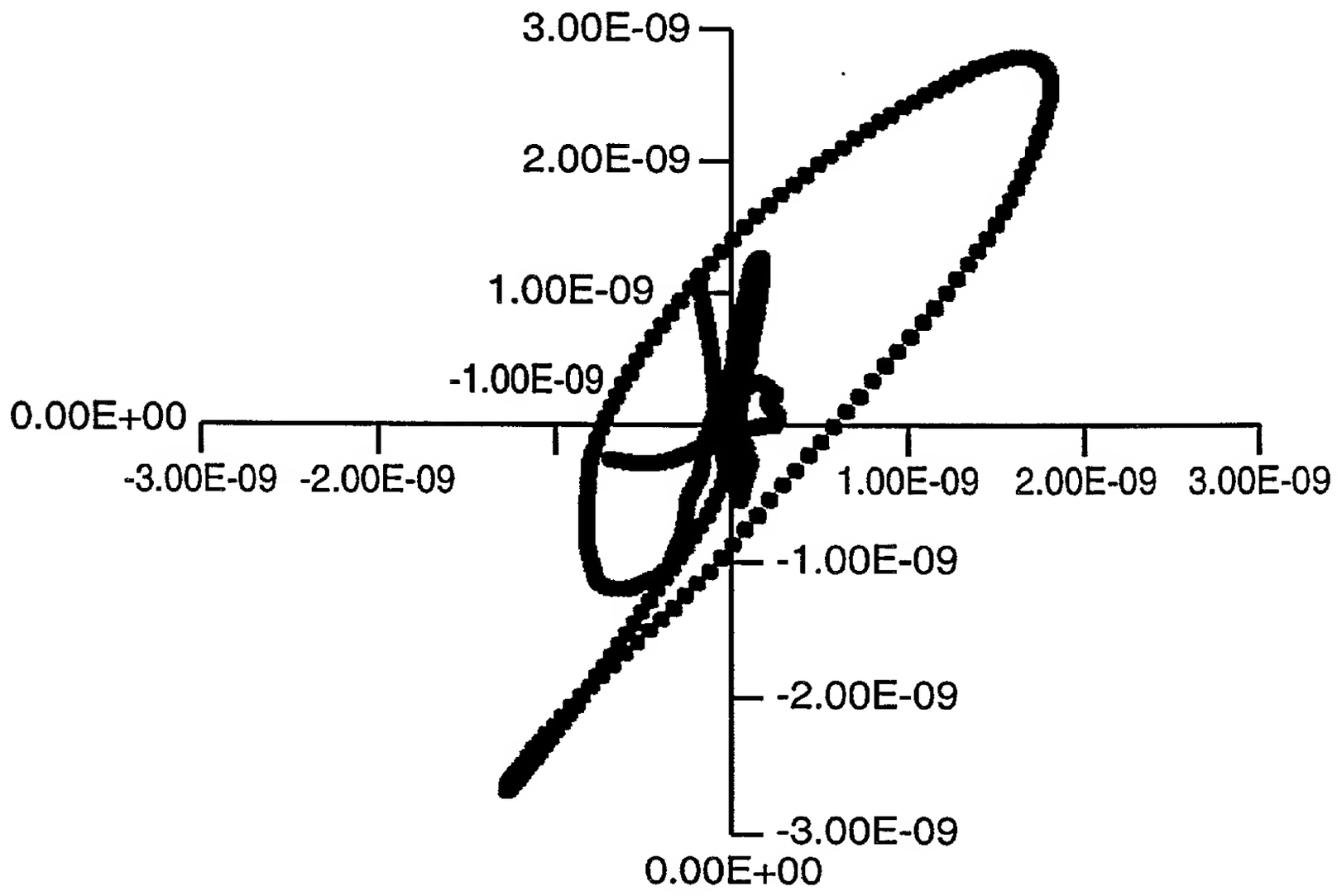

3.00E-09
2.00E-09
1.00E-09
-1.00E-09
0.00E+00
-3.00E-09
-2.00E-09
1.00E-09
2.00E-09
3.00E-09
-1.00E-09
-2.00E-09
-3.00E-09
0.00E+00

FIG._46

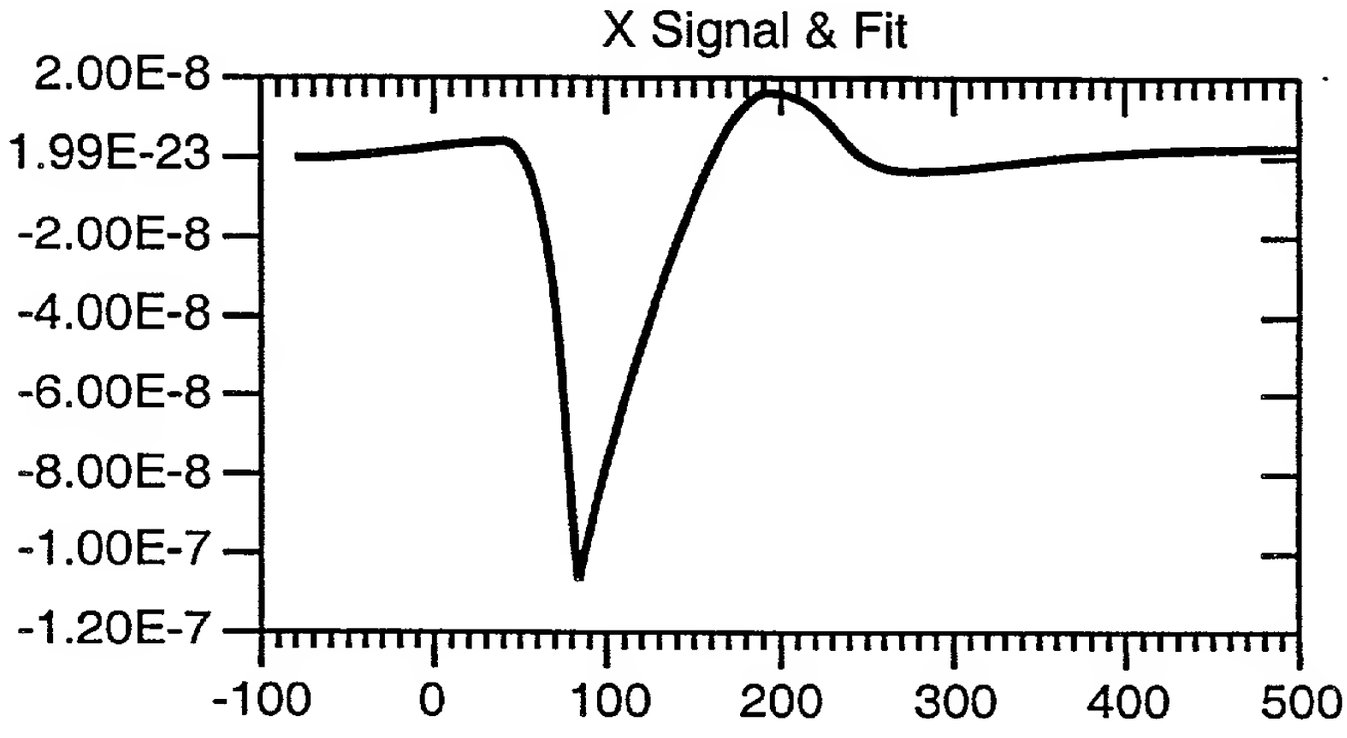


FIG._48

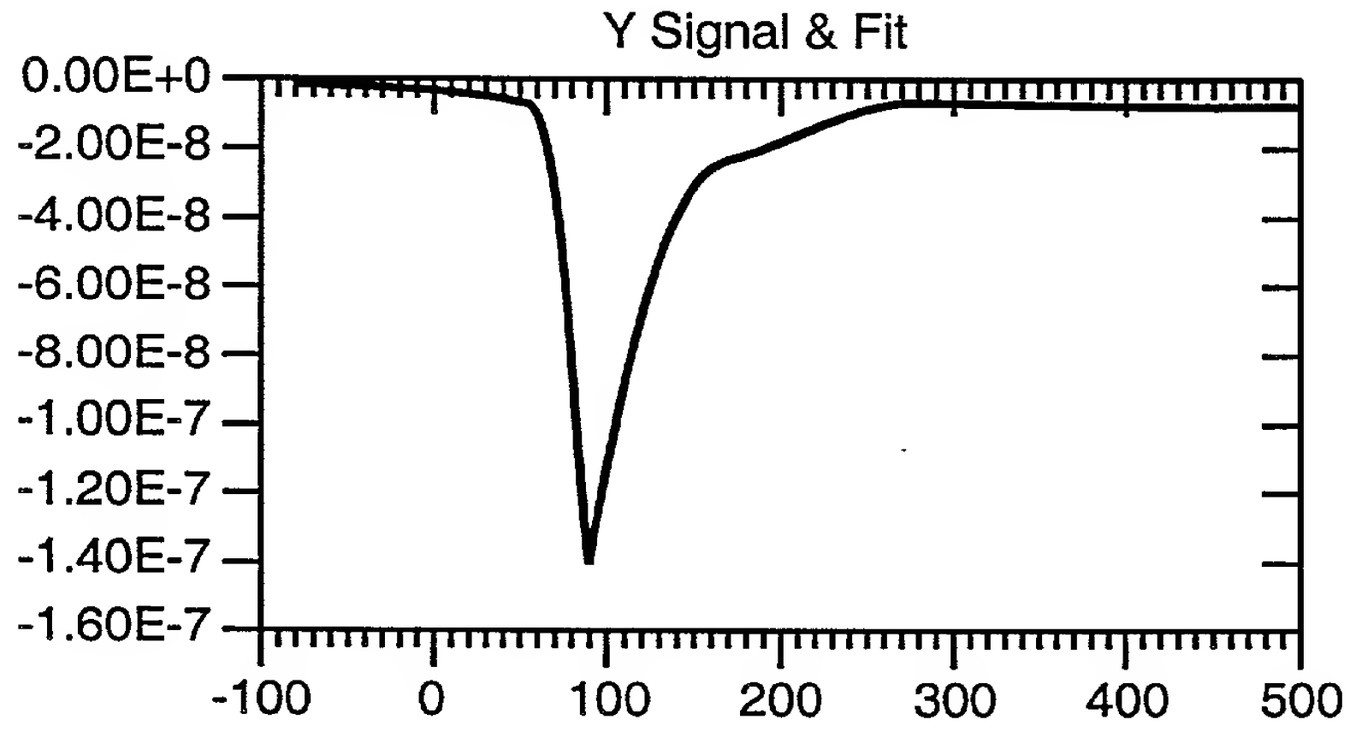


FIG._49

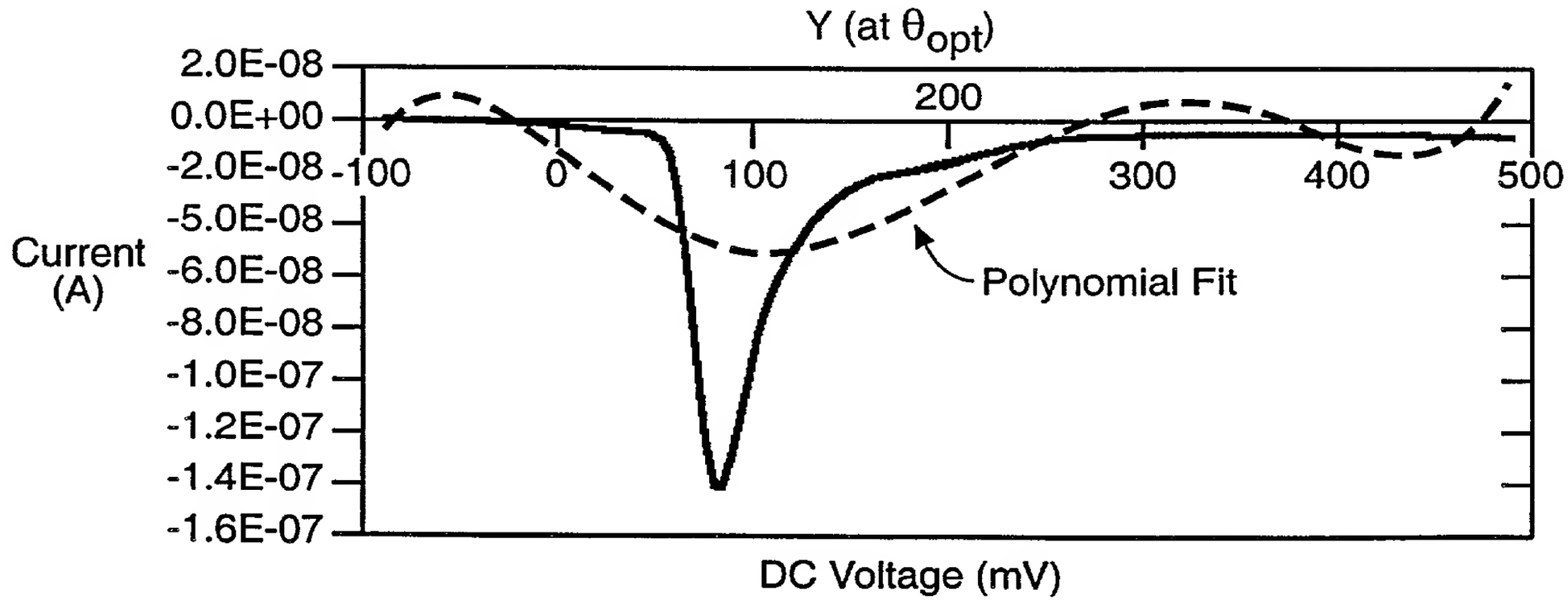


FIG._50

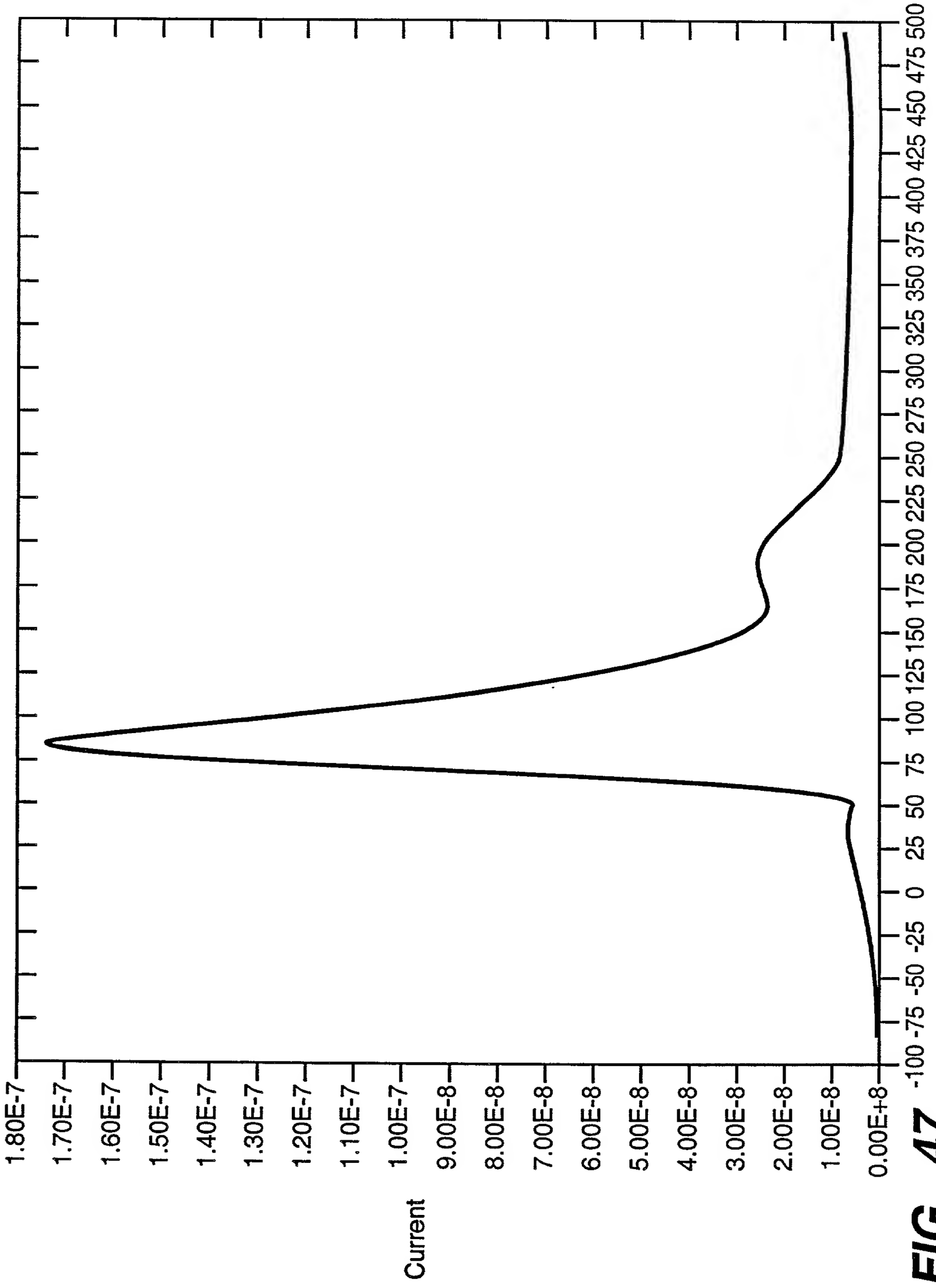

Current
1.80E-7
1.70E-7
1.60E-7
1.50E-7
1.40E-7
1.30E-7
1.20E-7
1.10E-7
1.00E-7
9.00E-8
8.00E-8
7.00E-8
6.00E-8
5.00E-8
4.00E-8
3.00E-8
2.00E-8
1.00E-8
0.00E+8
-100 -75 -50 -25 0 25 50 75 100 125 150 175 200 225 250 275 300 325 350 375 400 425 450 475 500

FIG._47

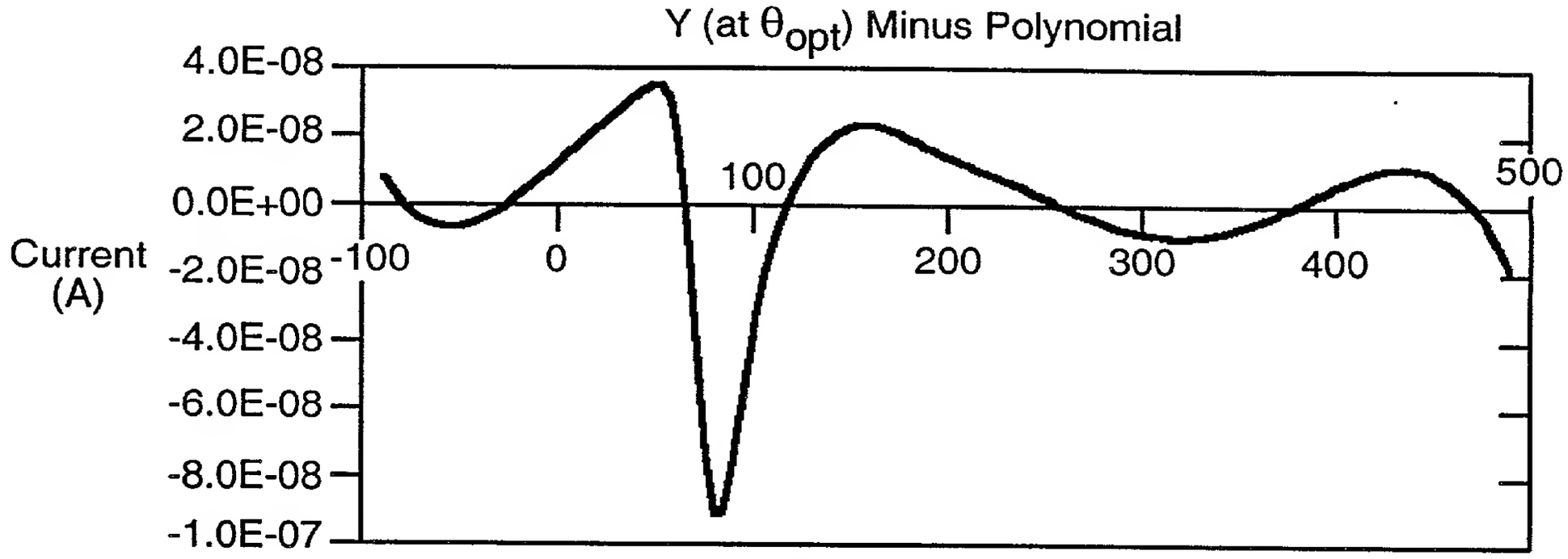

Y (at θ_{opt}) Minus Polynomial
4.0E-08
2.0E-08
0.0E+00
-2.0E-08
-4.0E-08
-6.0E-08
-8.0E-08
-1.0E-07
Current (A)
-100
0
100
200
300
400
500
DC Voltage (mV)

FIG._51

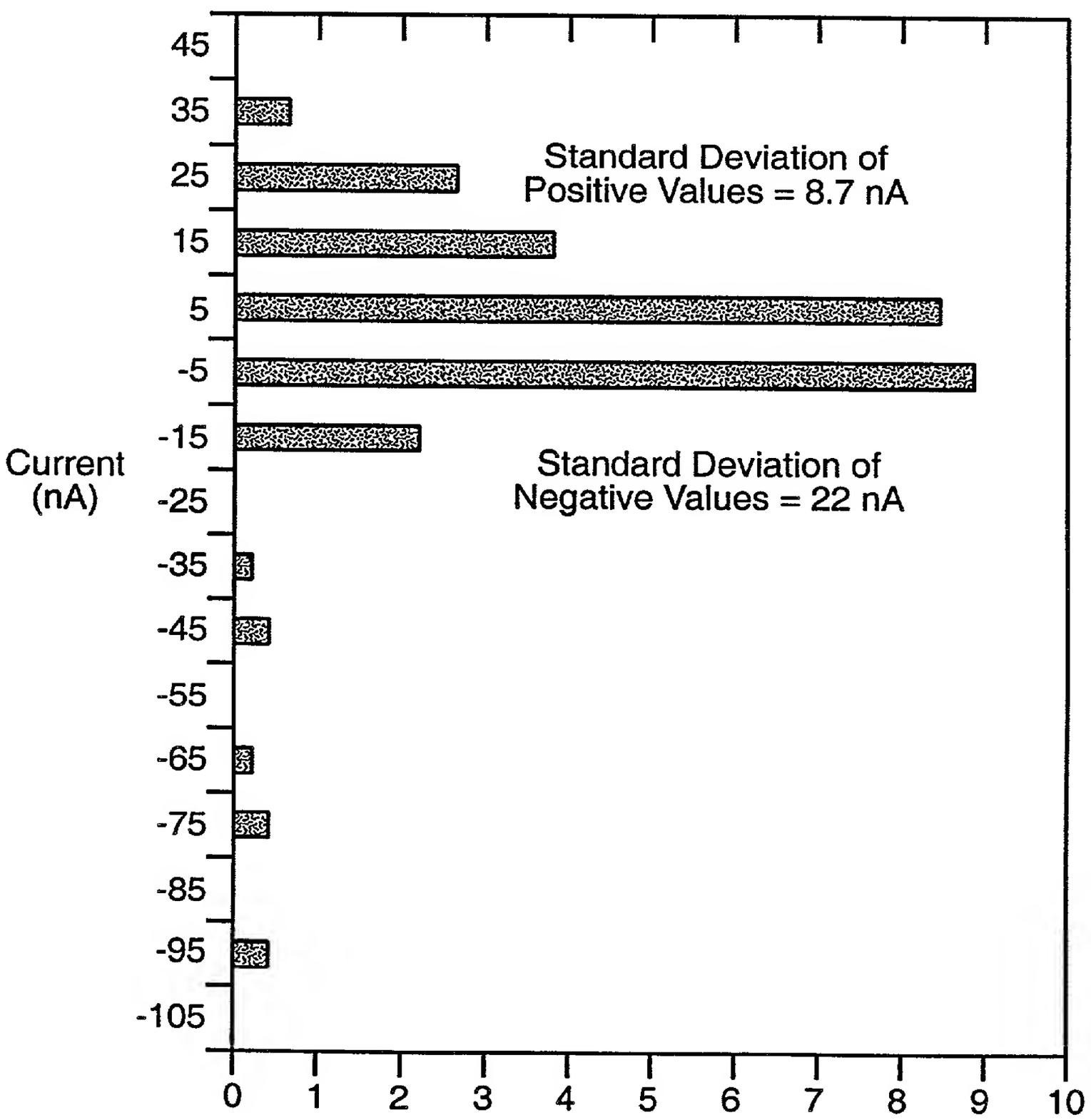

45
35
25
15
5
-5
-15
-25
-35
-45
-55
-65
-75
-85
-95
-105
Current (nA)
Standard Deviation of Positive Values = 8.7 nA
Standard Deviation of Negative Values = 22 nA
0
1
2
3
4
5
6
7
8
9
10
Frequency per mV

FIG._52

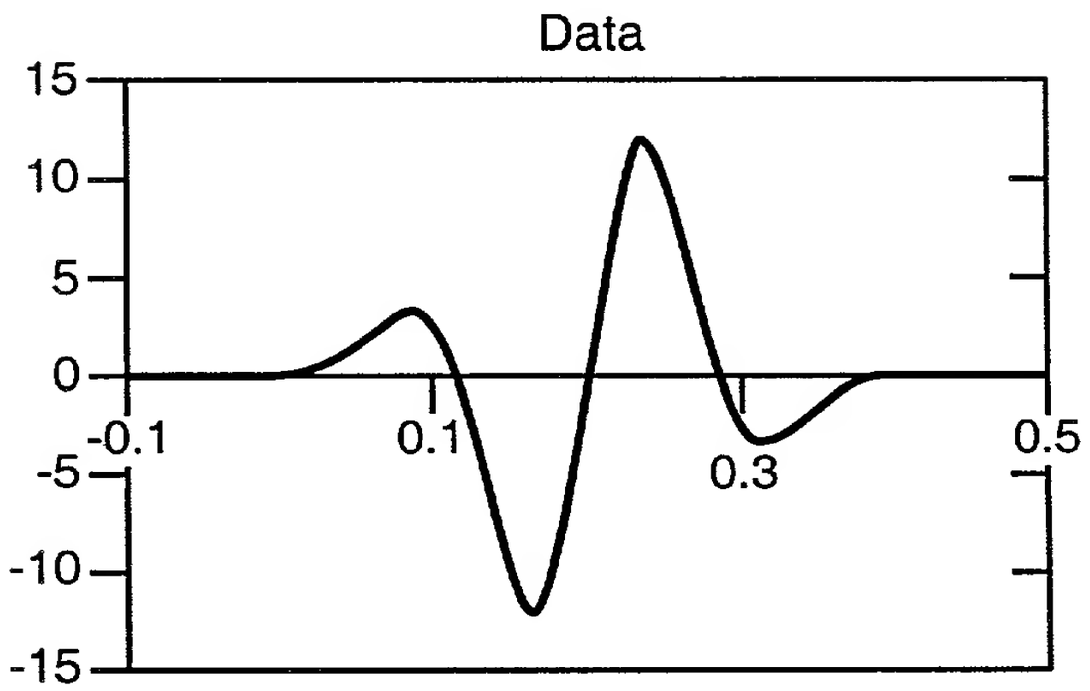

Data
15
10
5
0
-5
-10
-15
-0.1
0.1
0.3
0.5

FIG._53

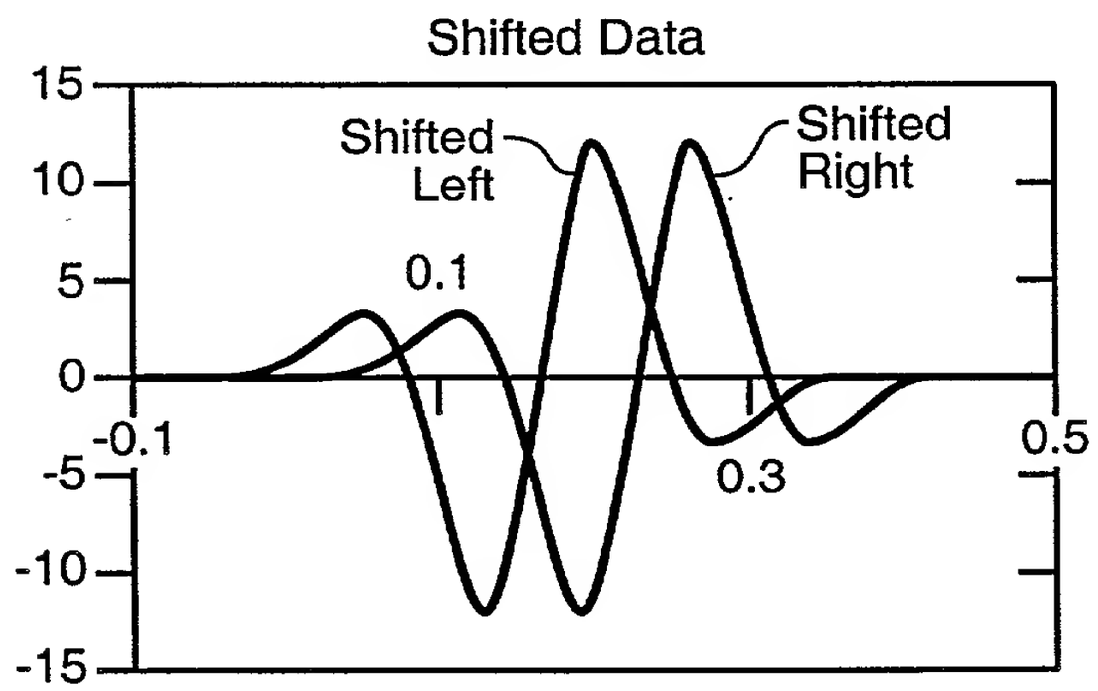

Shifted Data
15
10
5
0
-5
-10
-15
Shifted Left
Shifted Right
0.1
-0.1
0.3
0.5

FIG._54

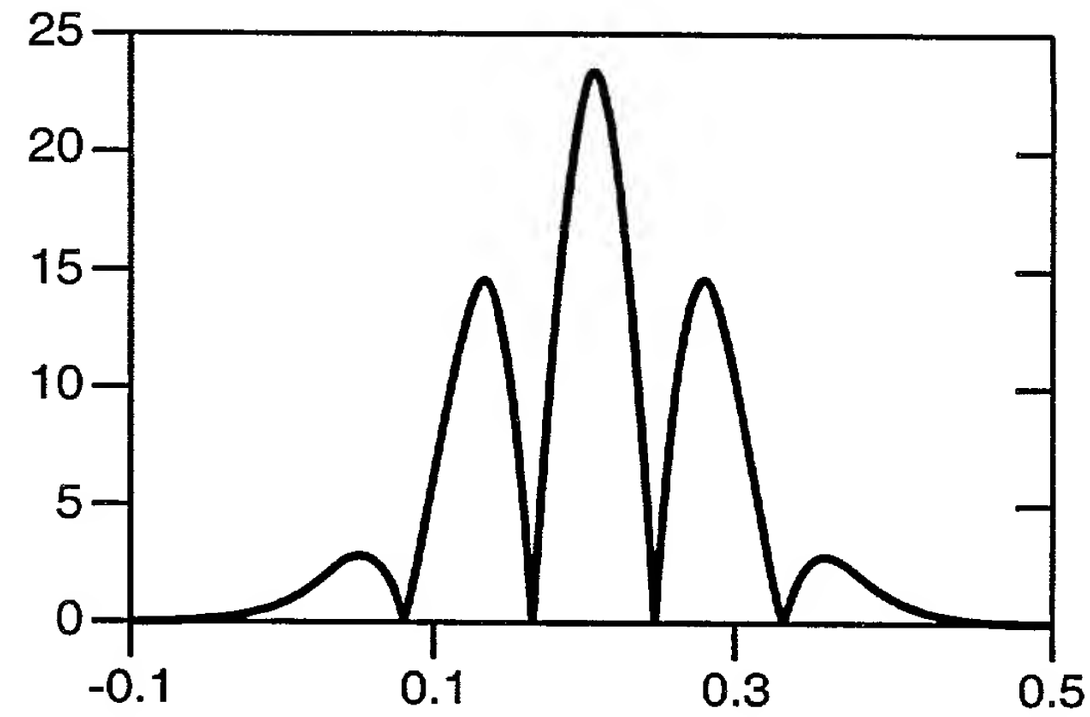


FIG._55

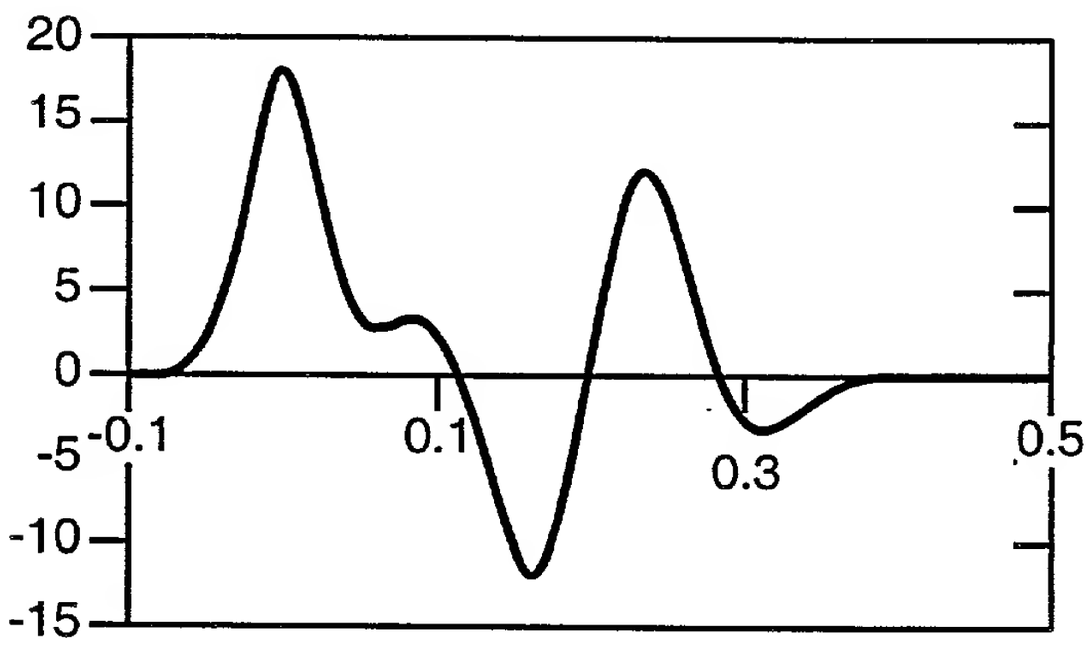


FIG._56

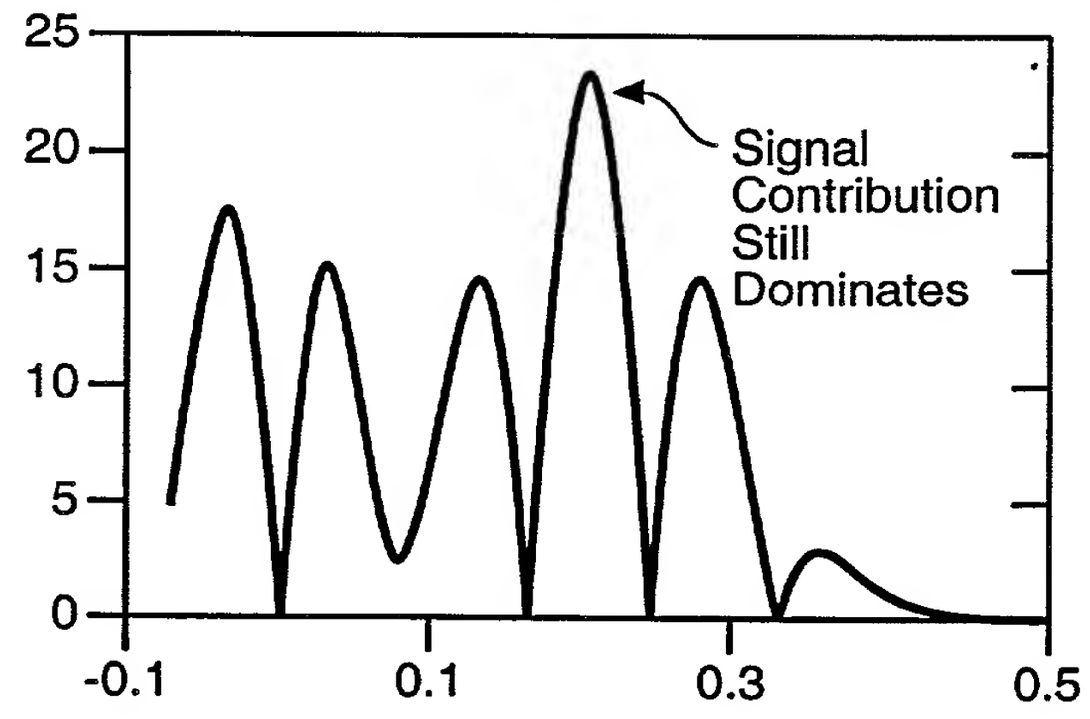


FIG._57

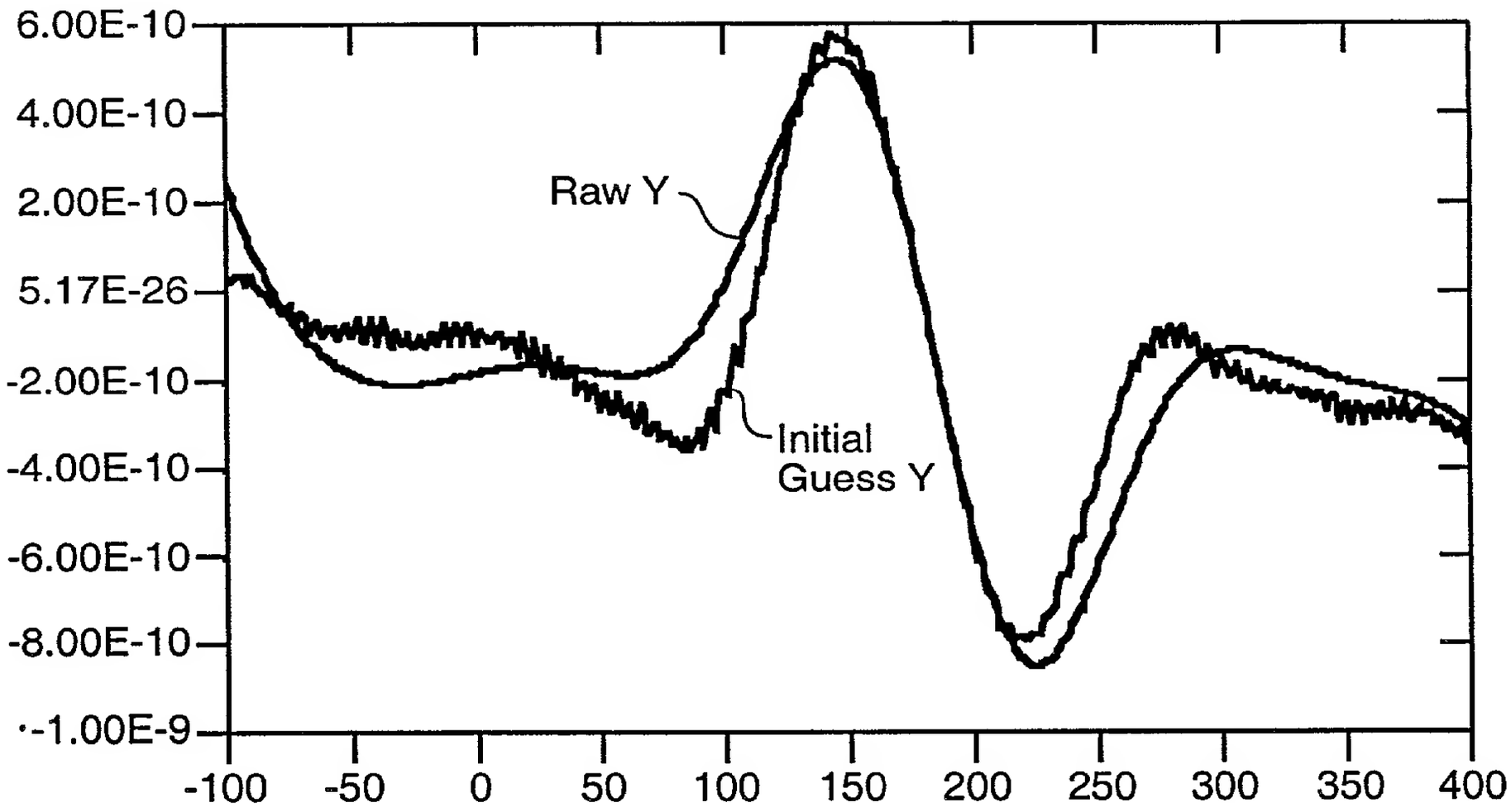

6.00E-10
4.00E-10
2.00E-10
5.17E-26
-2.00E-10
-4.00E-10
-6.00E-10
-8.00E-10
-1.00E-9
Raw Y
Initial
Guess Y
-100
-50
0
50
100
150
200
250
300
350
400

FIG._58

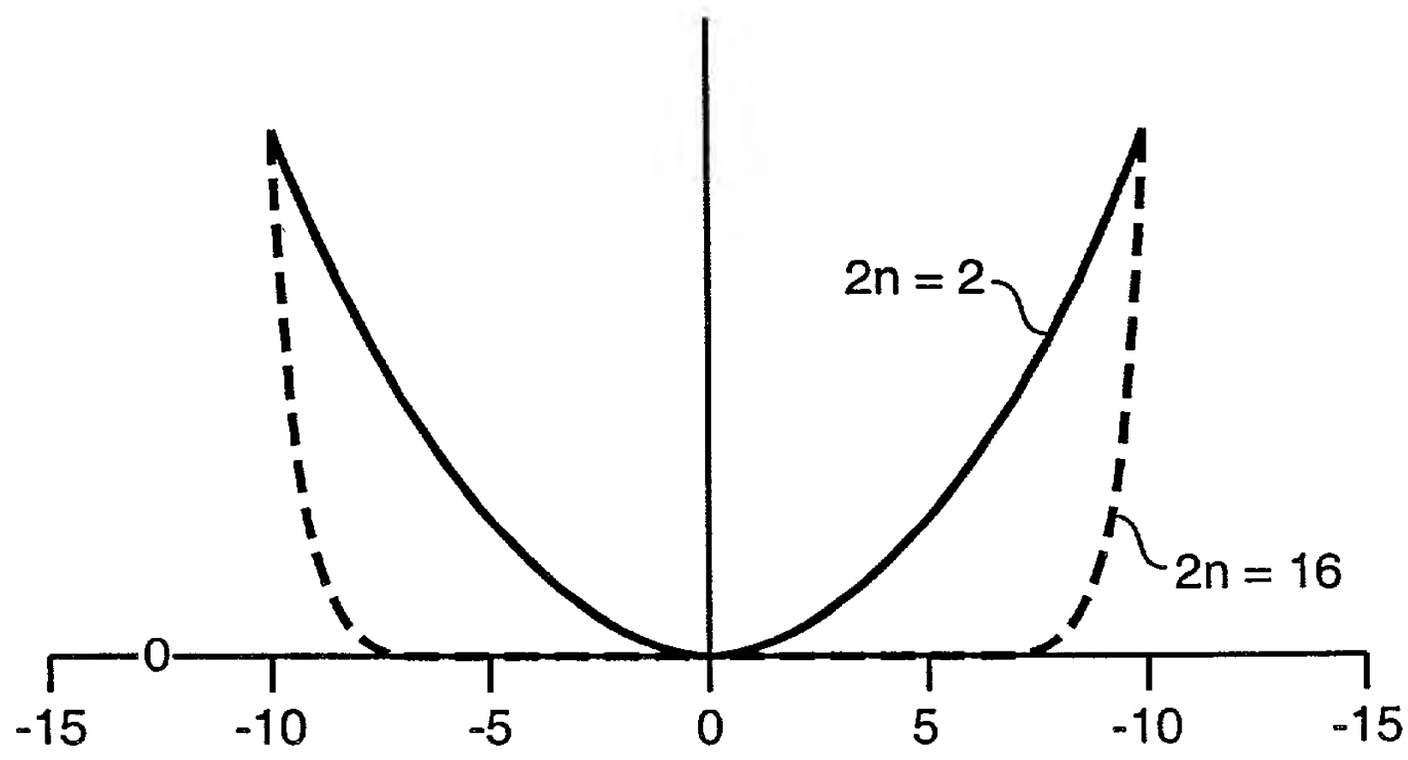

2n = 2
2n = 16
0
-15
-10
-5
0
5
-10
-15
a - Expected a

FIG._59

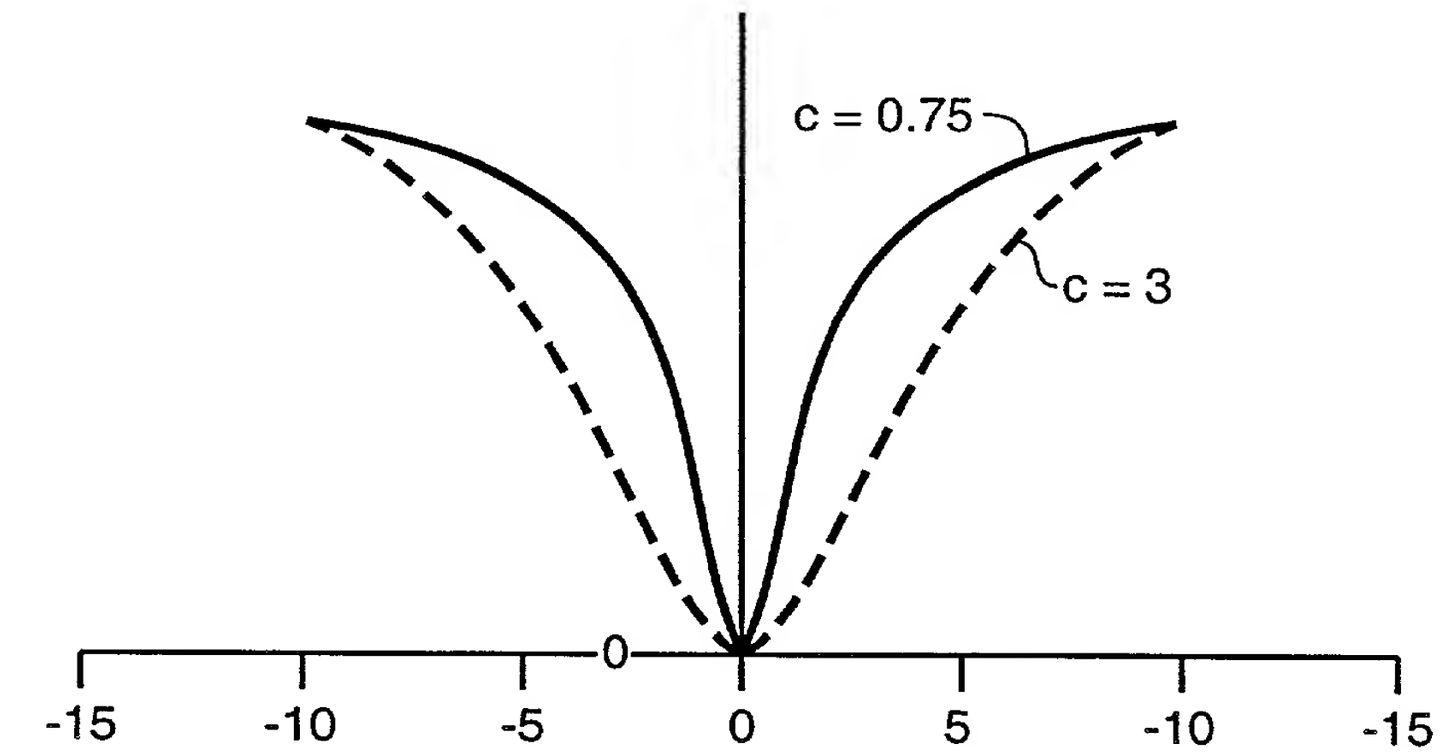

c = 0.75
c = 3
0
-15
-10
-5
0
5
-10
-15
a - Expected a

FIG._60

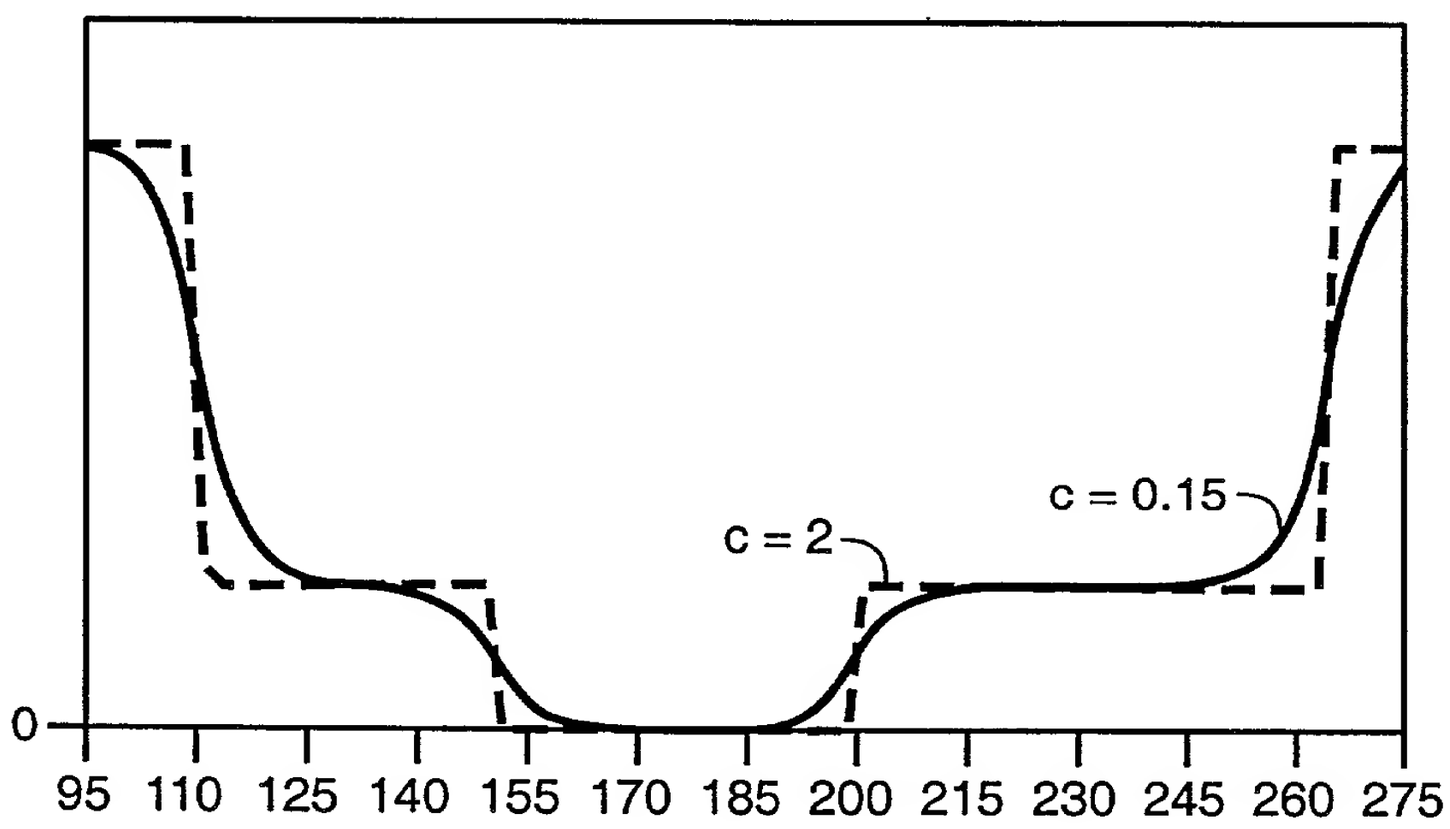

c = 0.15
c = 2
0
95
110
125
140
155
170
185
200
215
230
245
260
275
Width (In mV)

FIG._61

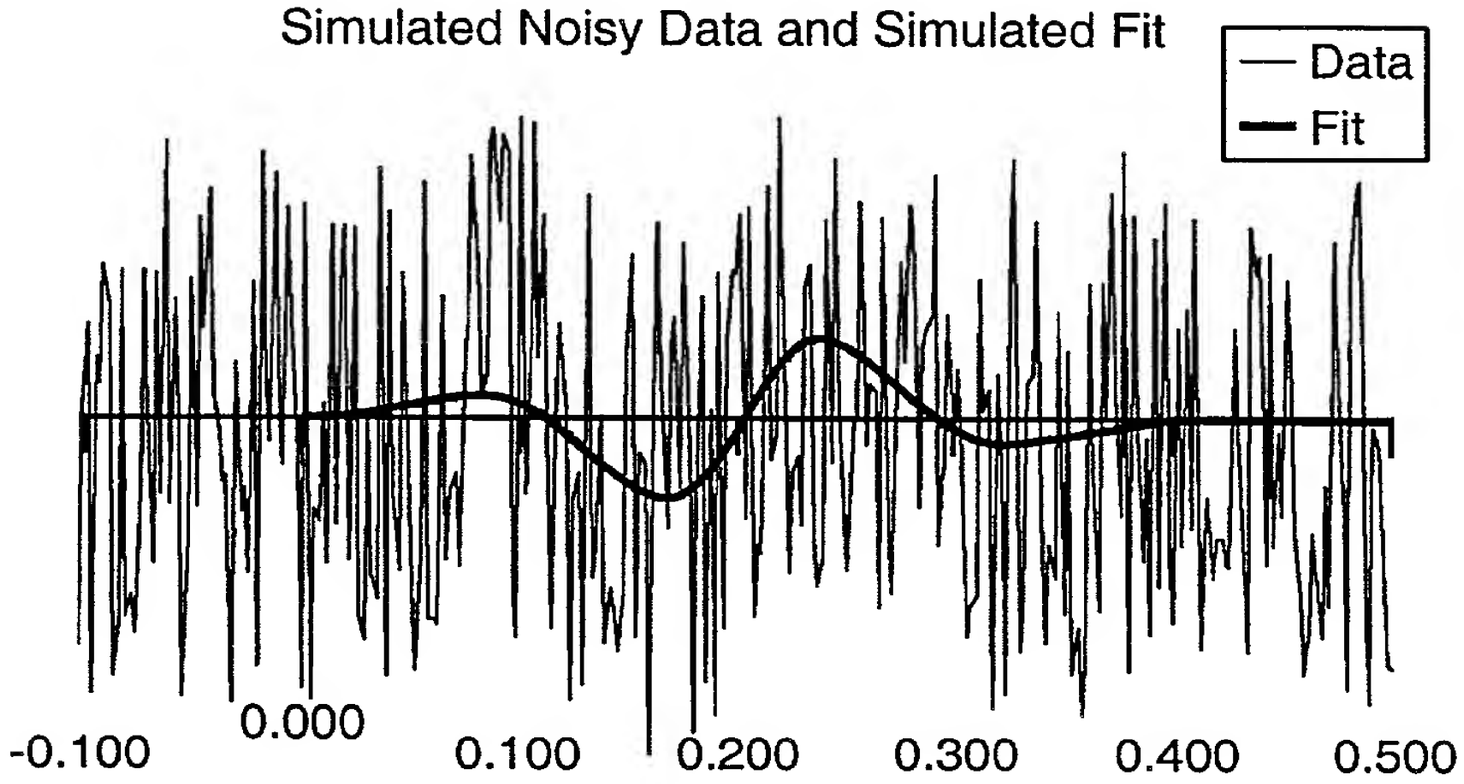


FIG._62

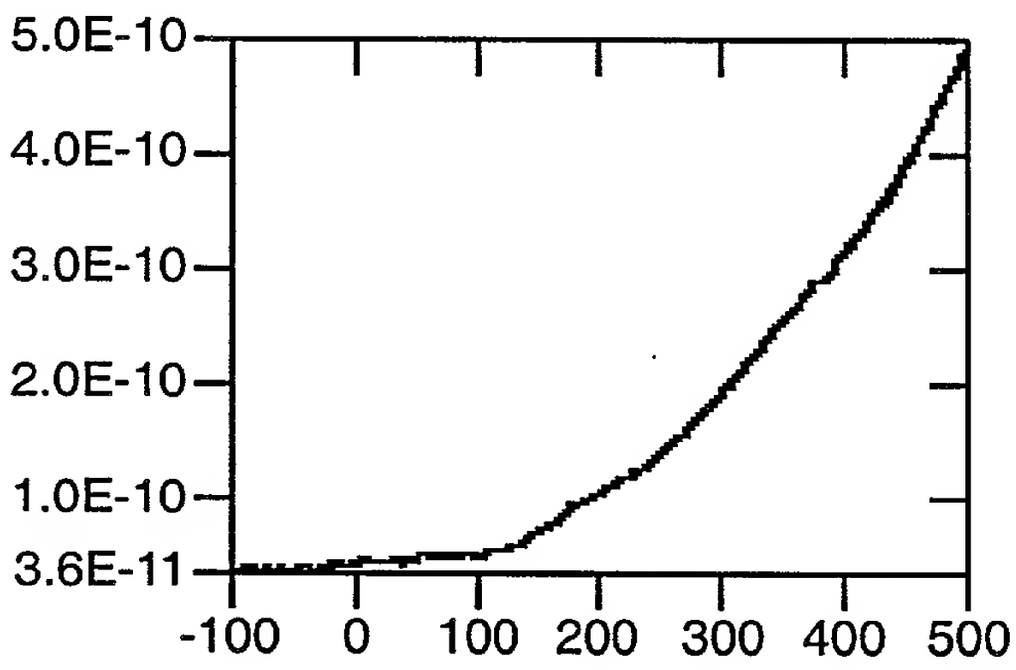


FIG._63

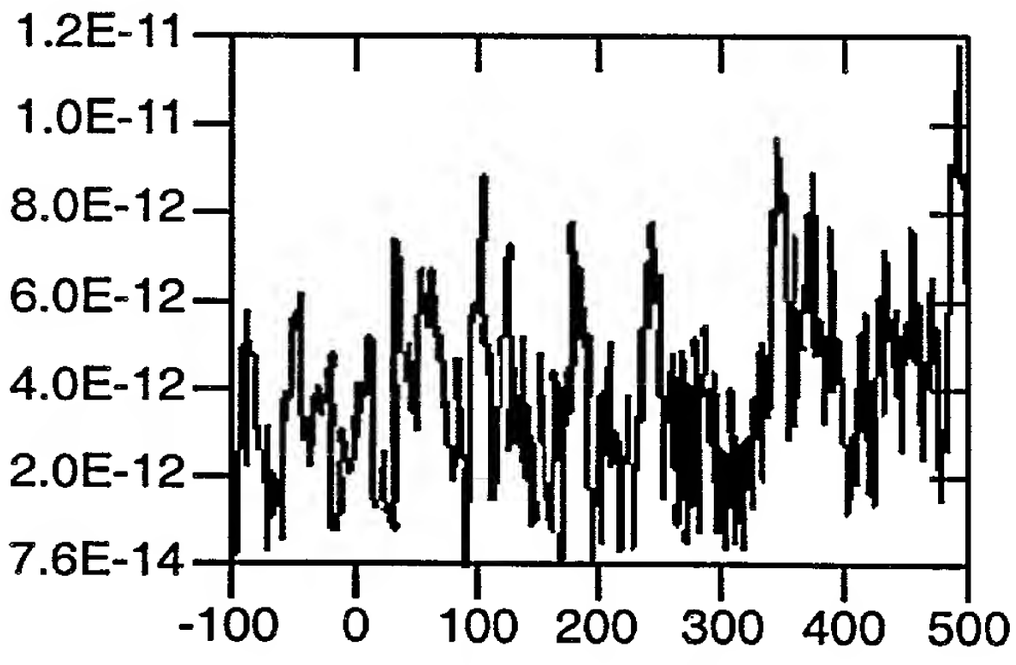


FIG._64

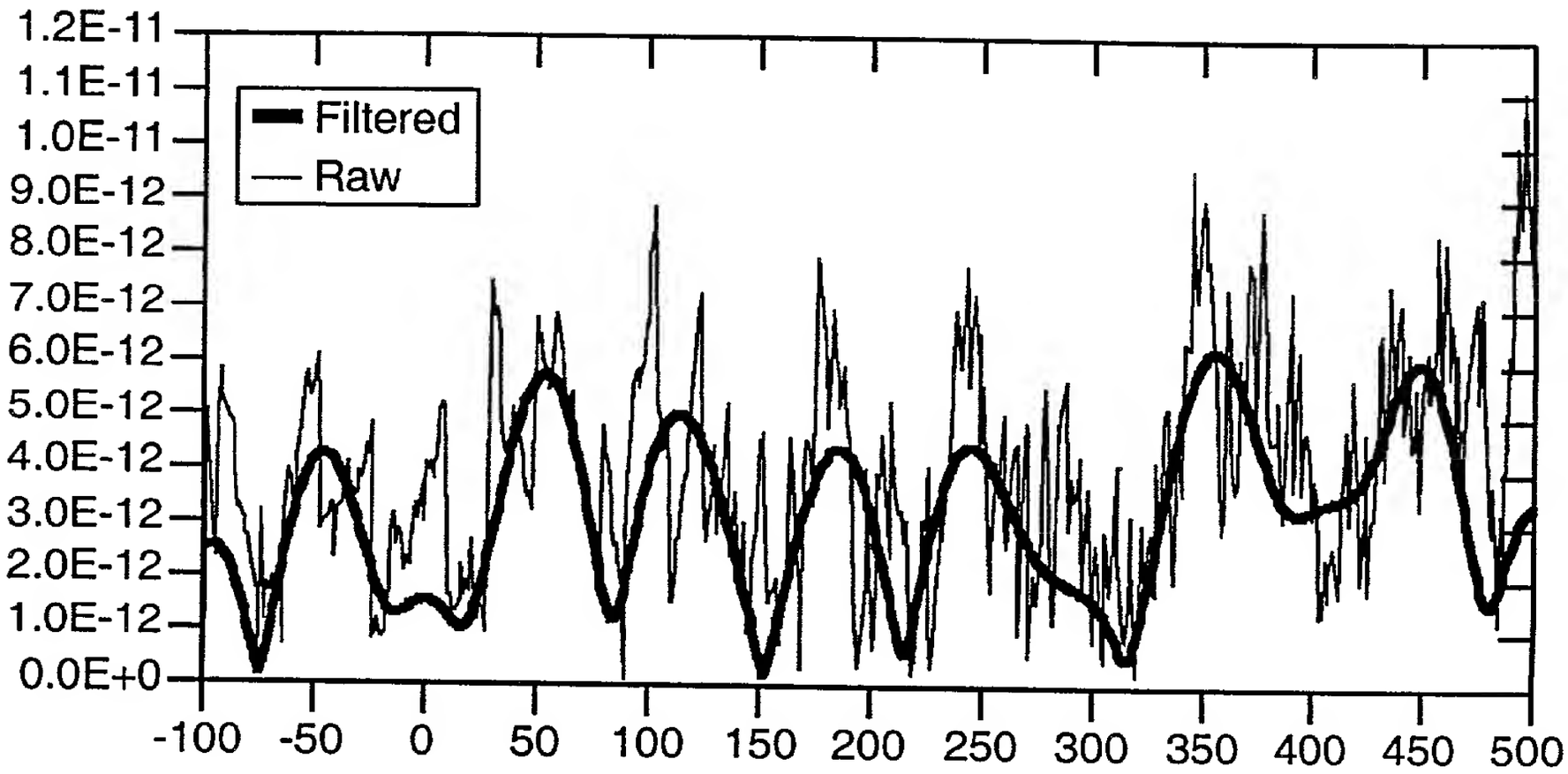


FIG._65

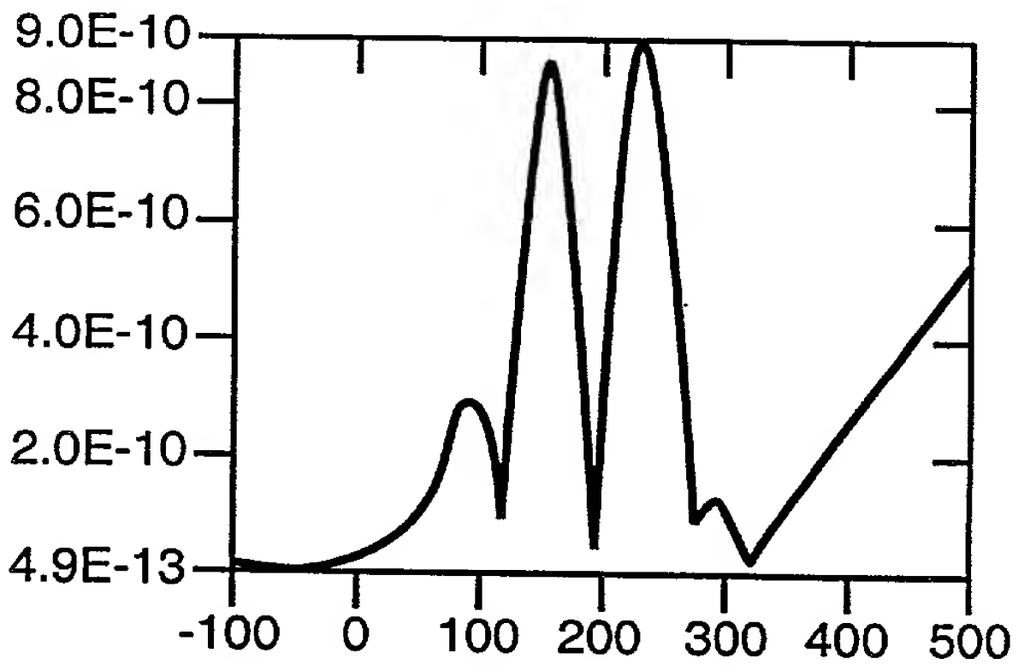


FIG._66

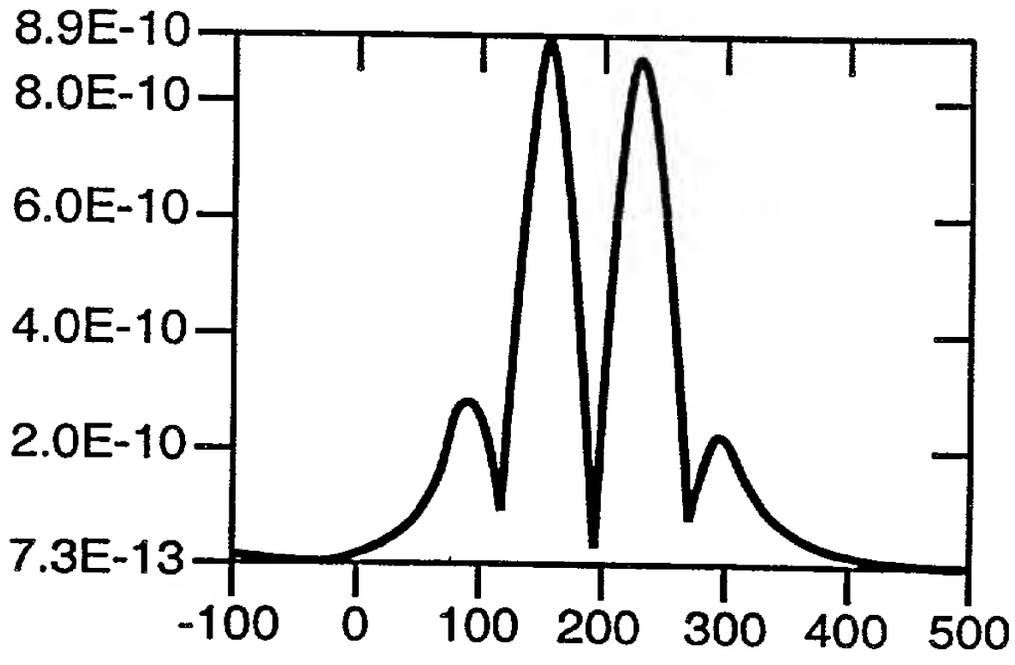


FIG._67

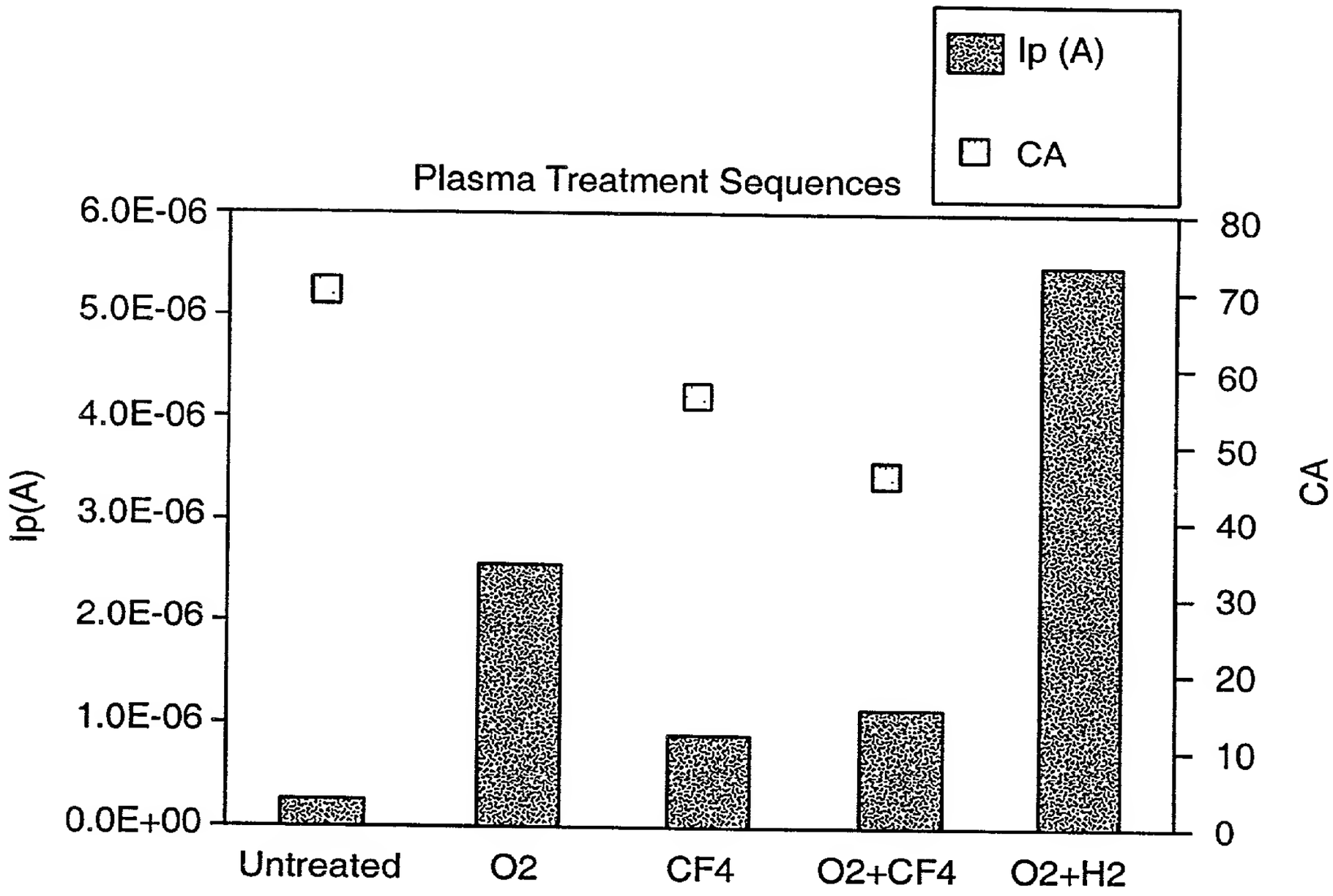

Plasma Treatment Sequences
Ip (A)
CA
Ip(A)
CA
6.0E-06
5.0E-06
4.0E-06
3.0E-06
2.0E-06
1.0E-06
0.0E+00
80
70
60
50
40
30
20
10
0
Untreated
O2
CF4
O2+CF4
O2+H2

FIG._68

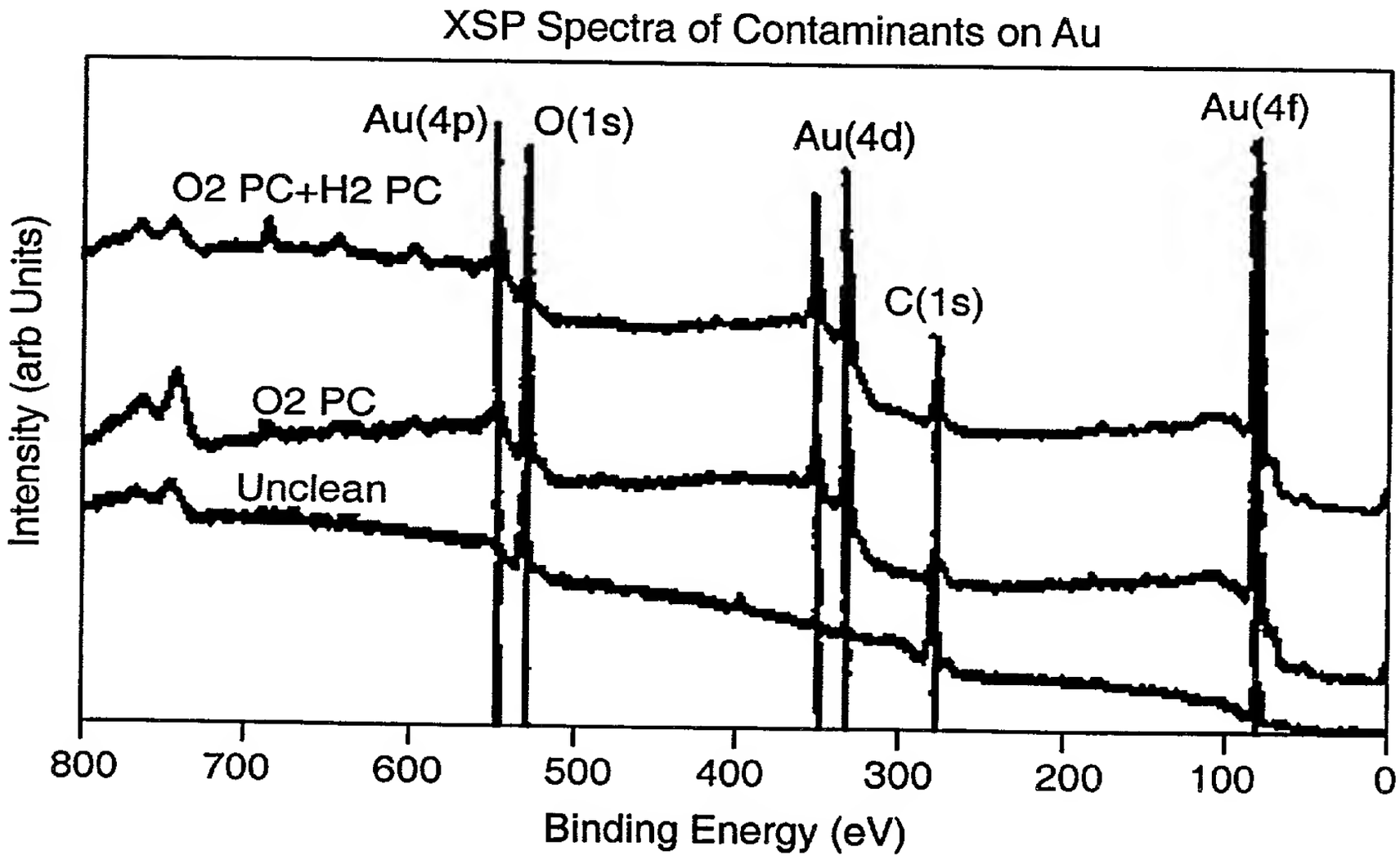

XSP Spectra of Contaminants on Au
Au(4p)
O(1s)
Au(4d)
Au(4f)
O2 PC+H2 PC
C(1s)
O2 PC
Unclean
Intensity (arb Units)
800
700
600
500
400
300
200
100
0
Binding Energy (eV)

FIG._69

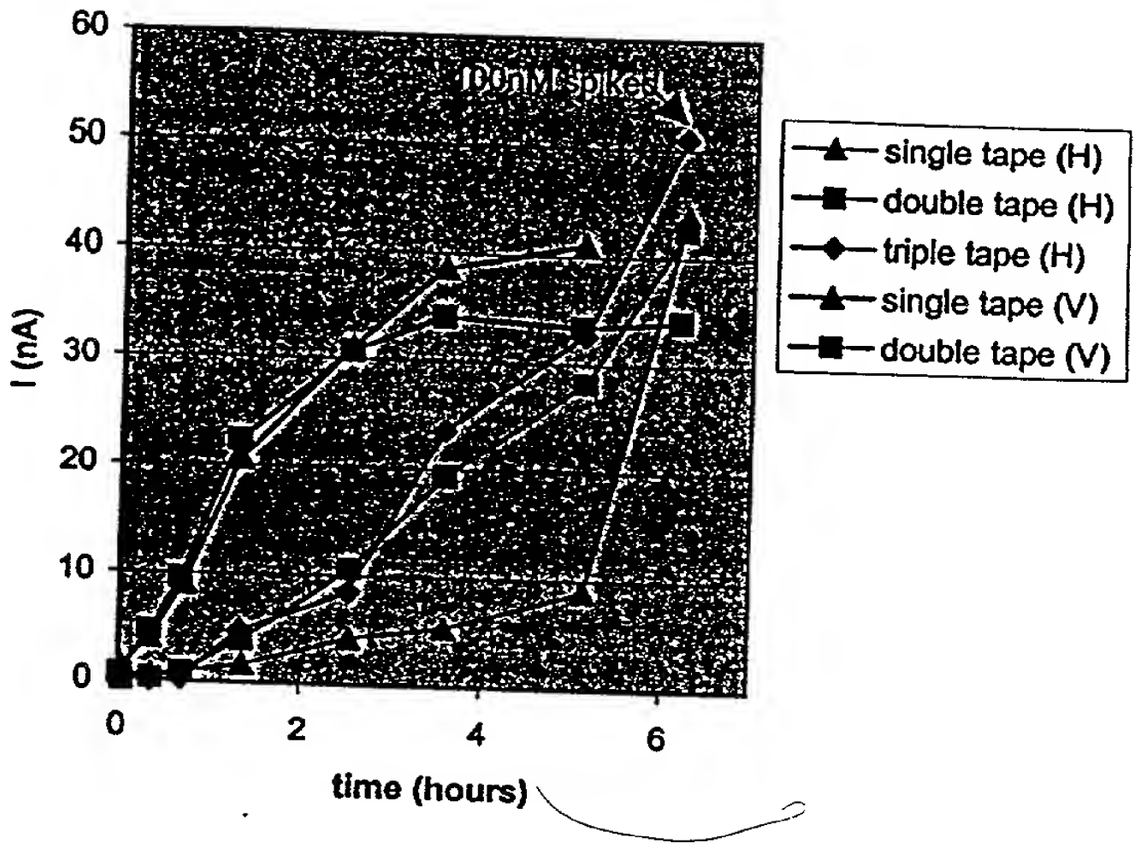


Figure 70A

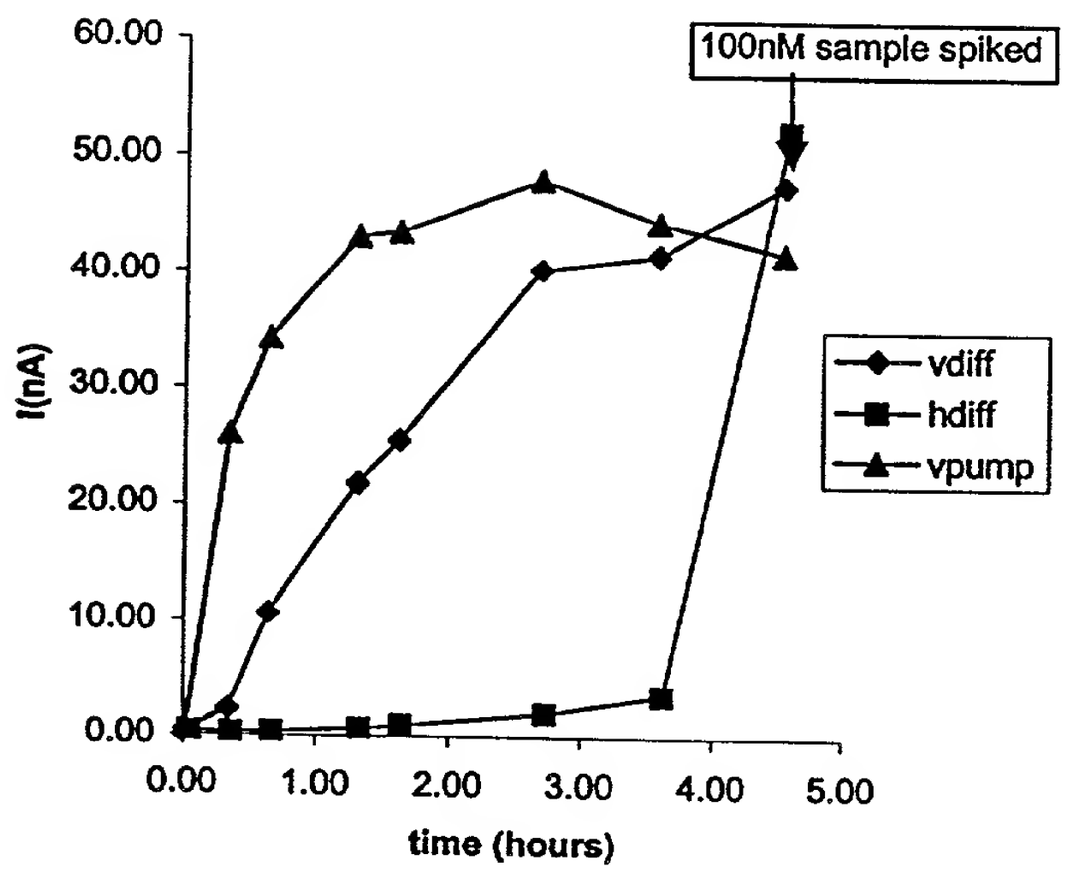


Fig. 70B

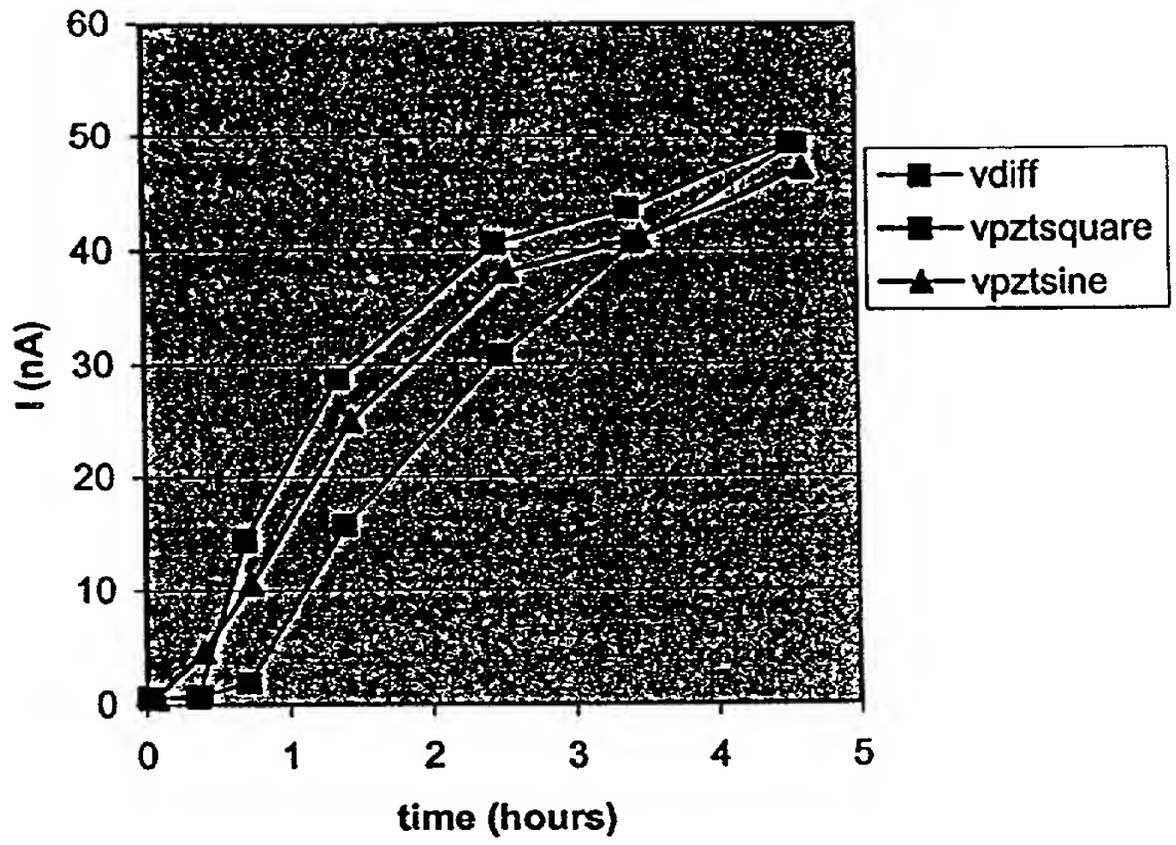


Fig. 70 C

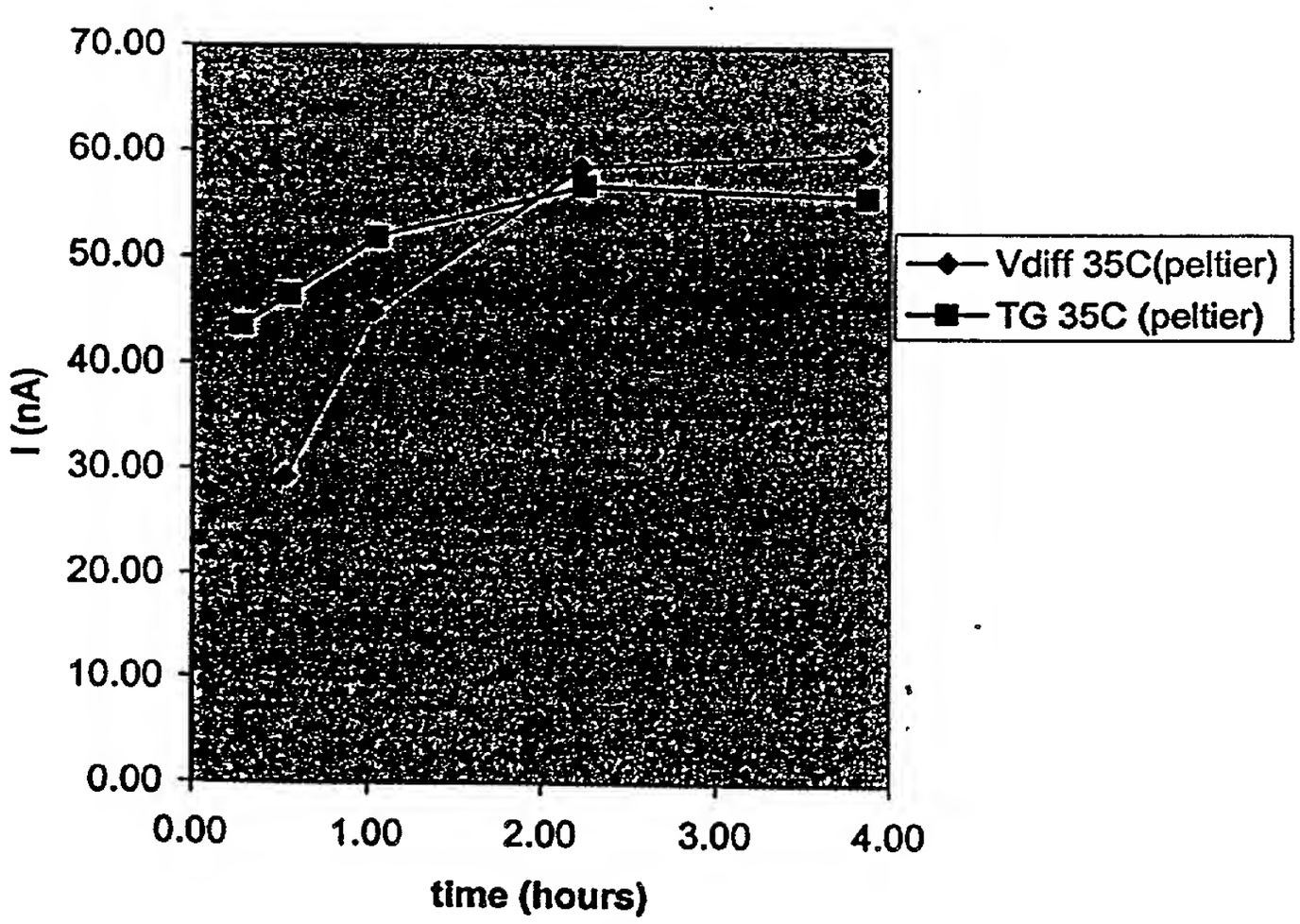


Fig. 70D

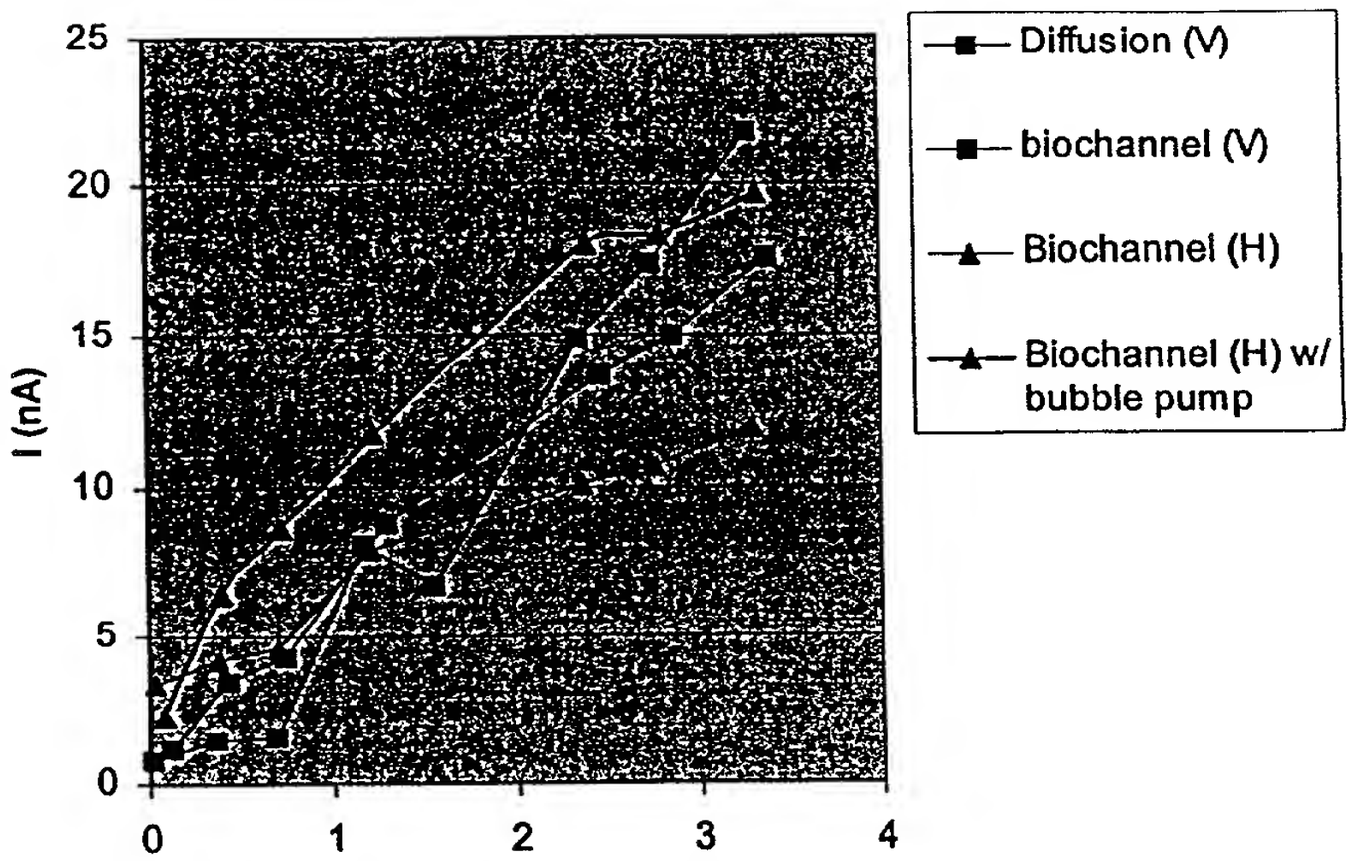


Figure 70E

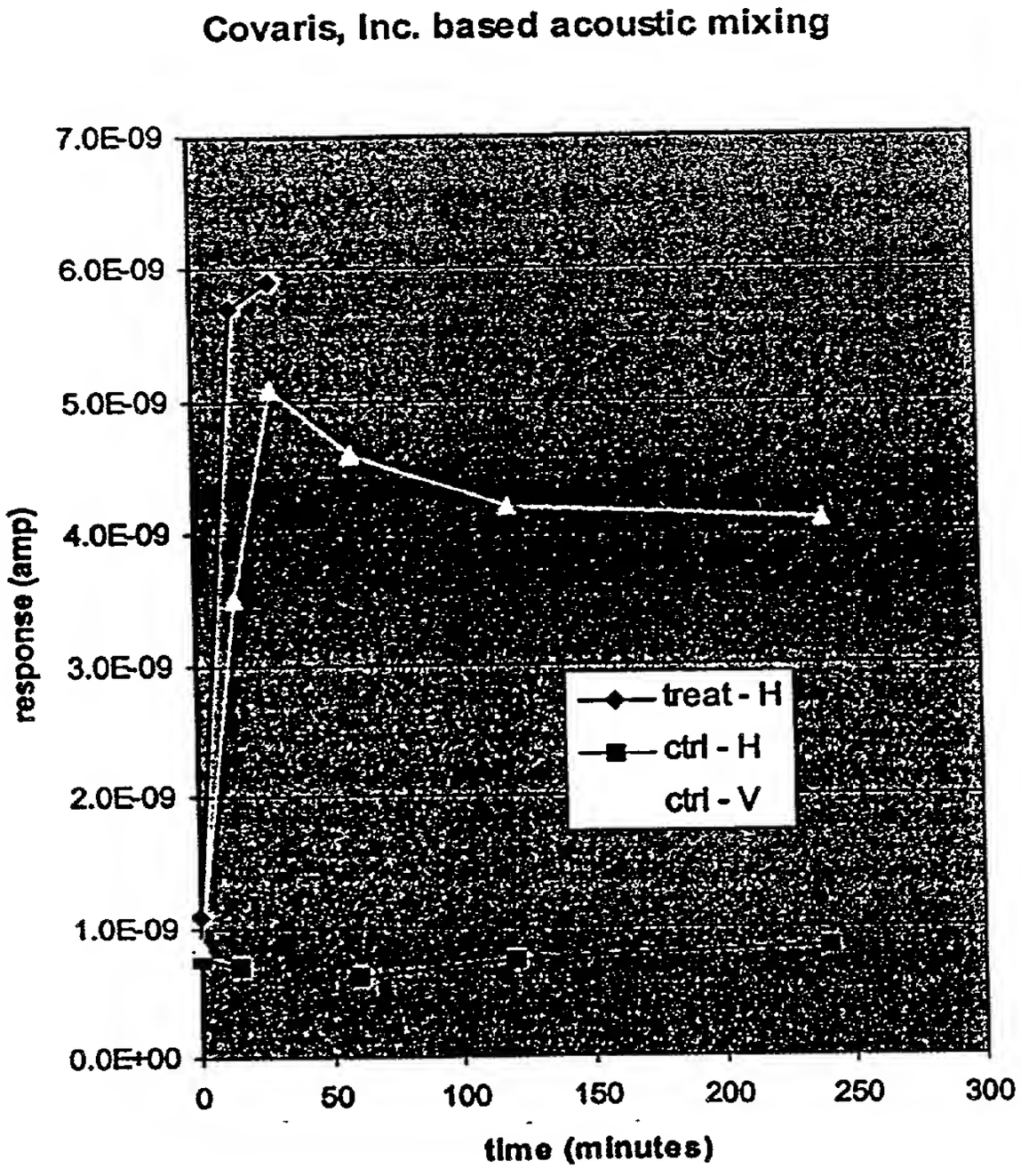


Fig. 70F

Signal Processing Block Diagram

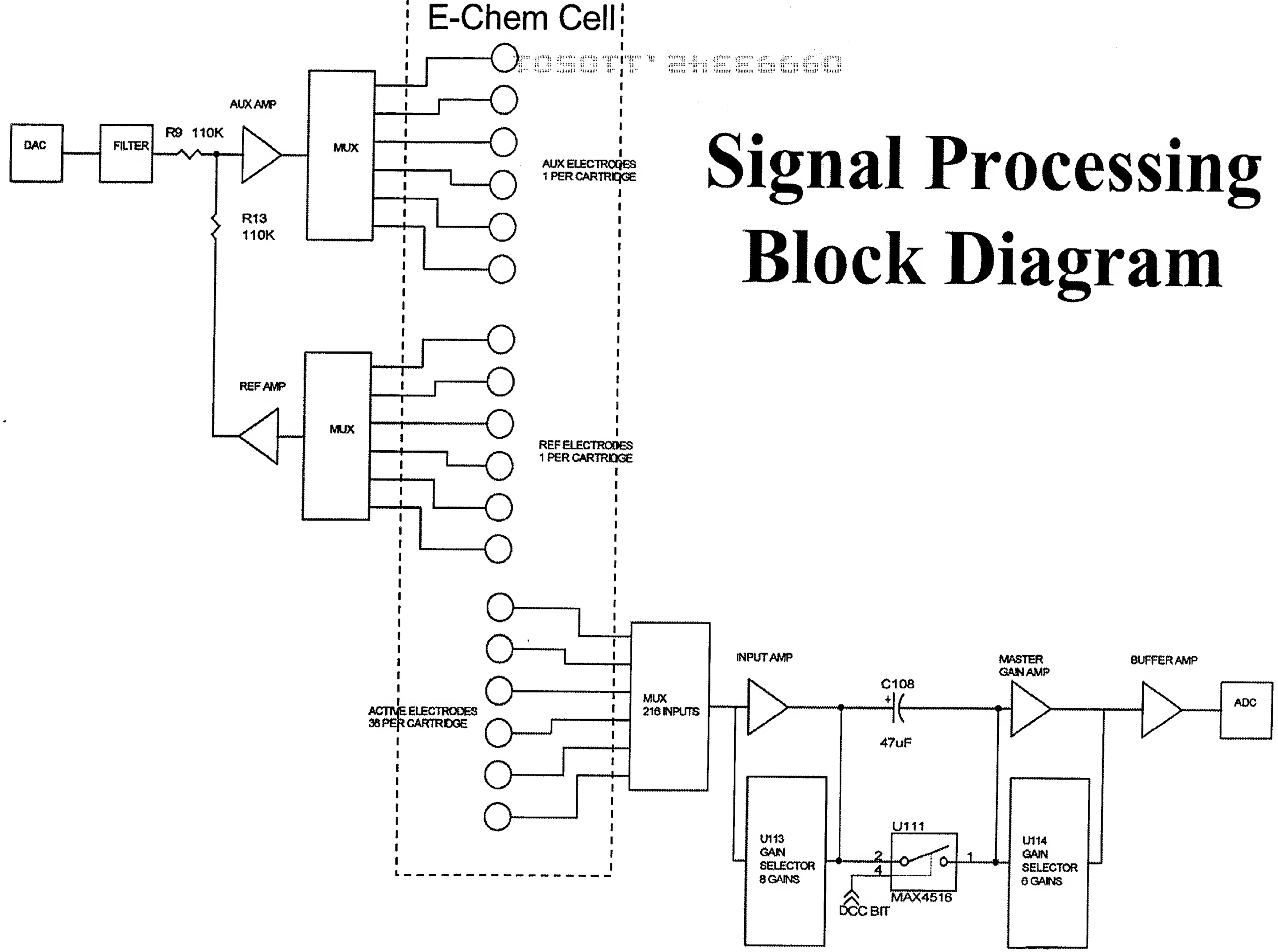


Fig. 71

Thermal Control Block Diagram

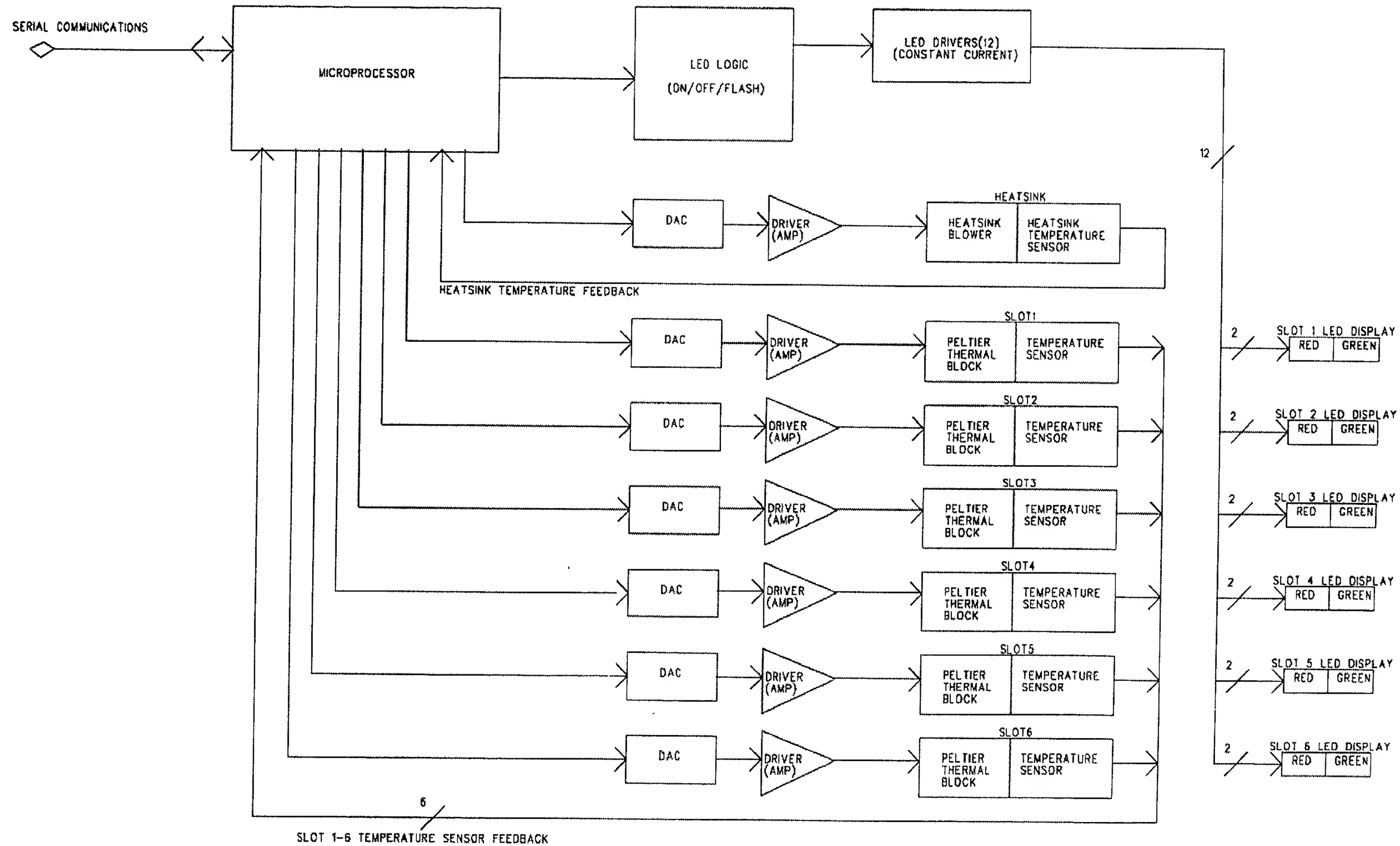


Fig 72

Signal Processing Board Layout

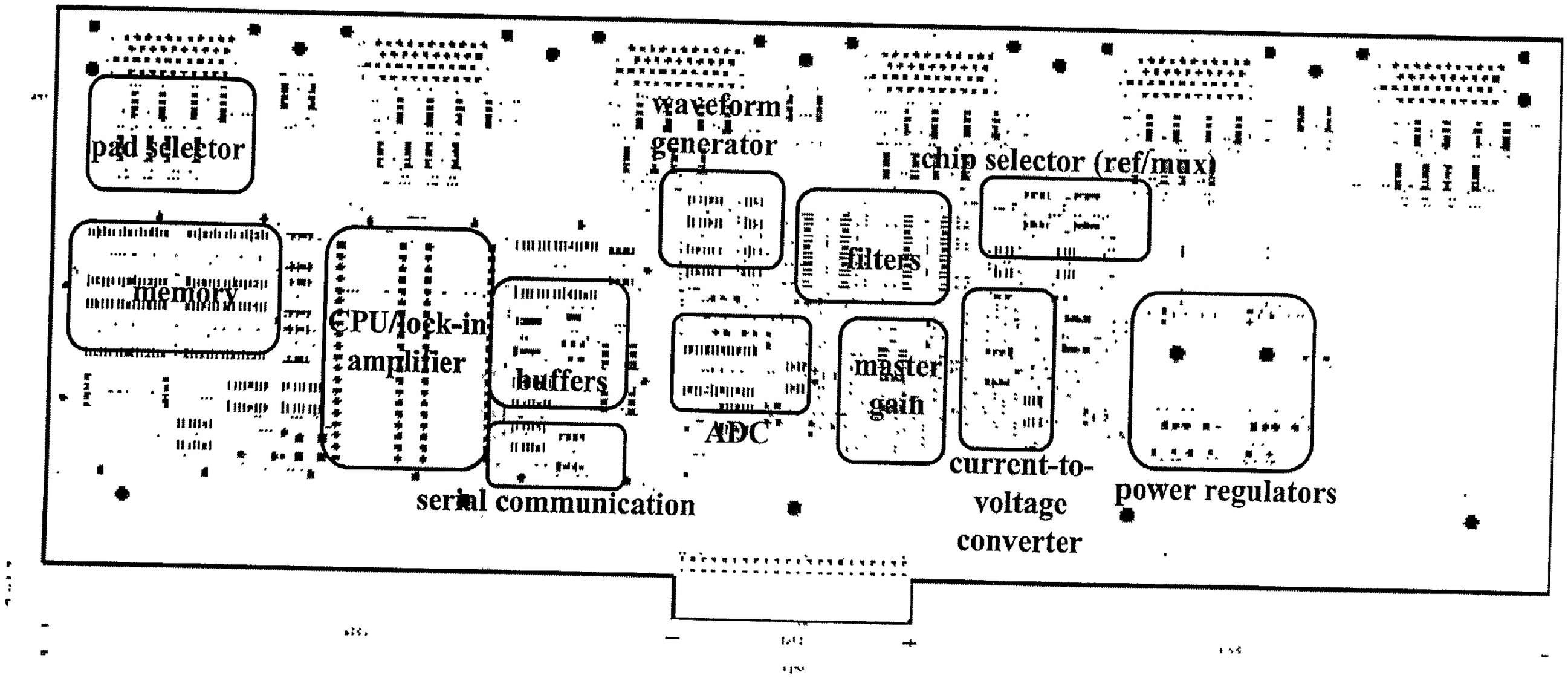


Fig 73